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No. 551

In the
Supreme Court of the United States

OCTOBER TERM, 1968

CORN PRODUCTS COMPANY, *Petitioner*

vs.

BAXTER LABORATORIES, INC., *Respondent*

PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE SEVENTH CIRCUIT

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The Scheffer Press, Inc.—ANdover 3-6850

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Petitioner, Corn Products Company, prays that a Writ of Certiorari issue to review the judgment of the United States Court of Appeals for the Seventh Circuit in the above-entitled case.

OPINIONS BELOW

The opinion of the Court of Appeals in this—a patent case—is reported at 394 F. 2d 892 and is reprinted in the Appendix to this petition, p. 3a. It reversed the judgment of the District Court for the Northern District of Illinois, Eastern Division, Judge James B. Parsons presiding, whose opinion does not appear in the printed reports but has been printed in the accompanying Appendix, p. 13a.

JURISDICTION

The judgment of the Court of Appeals was entered on May 1, 1968. A timely Petition for Rehearing was denied on June 7, 1968. An extension of the time to file this petition until September 23 was granted by this Court on September 3, 1968 and the Court of Appeals has likewise stayed the mandate until that day. The jurisdiction of this Court is invoked pursuant to 28 U.S.C. §1254 (1). The basis of jurisdiction in the District Court was 28 U.S.C. §§ 1338(a) and 2201.

QUESTIONS PRESENTED

The patent claims a process of producing crystalline dextrose from starch in which the improvement relied on for patentability is the use of a special enzyme as a catalyst in that old chemical process. The trial court found explicitly that the patent failed to disclose such an enzyme or how to produce one and held the patent invalid for that reason. The Court of Appeals did not hold such findings erroneous but reversed the trial court and reinstated respondent's patent monopoly.

There are two related but separate questions presented:

(1) Can a patent on an alleged improvement in an old process be valid under 35 U.S.C. 112 where it fails to provide the public with the very information required to achieve that improvement?

(2) Where the trial court has found the patent to have failed to disclose how to achieve the alleged improvement and has held the patent invalid under 35 U.S.C. 112 and where the Court of Appeals has, in disregard of Rule 52(a) of the Federal Rule of Civil Procedure, reversed the trial court

without determining such findings to be erroneous, has there been *due process,* under the Fifth Amendment to the Constitution?

THE CERTIORARI POLICY

Should not this Court now give thorough consideration to the requirements of 35 U.S.C. 112—the "full disclosure" section of the Patent Code and either reaffirm the principles of *Beidler* v. *United States,* 253 U.S. 447 (1920) or, if the law has changed as indicated by the Court of Appeals in this case, enunciate a clear new standard in this vital area? Section 112 is the section under which the patentee is required to disclose to the public the details of his invention as consideration for the grant of seventeen years of patent monopoly. By granting certiorari here, needed guidance can be afforded the circuit courts on this vital subject, and a remarkably erroneous application of that statute in this case can be rectified in one of our busiest patent circuits.

Grant of certiorari here would provide a fitting complement to the recent decision of this Court in *Graham et al.* v. *John Deere Company, et al.,* 383 U.S. 1 (1966), which has served so well to clarify and to regularize the lower courts' treatment of "obviousness" defenses under 35 U.S.C. 103.

INTRODUCTORY STATEMENT

This petition raises squarely for consideration by this Court the measure of the disclosure which an inventor must cede to the public before being entitled to the grant of the monopoly contemplated by Article I, Section 8 of the Constitution and afforded by this nation's Patent Laws. It focuses the Court's attention on the considera-

tion, the public's *quid pro quo,* for the patentee's grant of immunity under our antimonopoly laws and, indeed, for this government's encouragement and enforcement of the monopoly accorded the owner of a valid patent grant.

This Court has recently considered the question of patentable invention under Article I, Section 8, Clause 8 of the Constitution and Sections 101, 102 and 103 of the Patent Code of 1952, 35 U.S. Code.[1] The character and quality of discovery, or improvement susceptible of protection by a patent grant so considered has a concomitant in the character and quality of the knowledge made known to the public as a necessary consideration for the patent grant. Since the earliest days of English law, the permitted grant of a monopoly on new manufactures, as an exception to the prohibition of monopolies in general, has been conditioned on an adequate public disclosure of the method of making and using the new manufacture. (21 Jac. I, ch. 3, See 16 U.S. Appendix 13) This prerequisite was carried into the patent laws of the United States from the beginning of its patent system. (Patent Act of 1970, Section 2, 1 Statutes at Large 109)

The purpose and measure of a patent's disclosure were last stated by this Court in 1920:

> "Ever since *Grant* v. *Raymond,* 6 Pet. 218, 247, it has been consistently held that a correct and adequate description or disclosure of a claimed discovery (which, in the case of a machine, involves particularly the operation of it) is essential to the validity of a patent, for the reason that such a disclosure is necessary in order *to give the public the benefit of the*

[1] *Graham* v. *John Deere Co.,* 383 U.S. 1 (1966); *United States* v. *Adams,* 383 U.S. 39 (1966); *Brenner* v. *Manson,* 383 U.S. 519 (1966).

> *invention after the patent shall expire.* The source of the power to grant patents, and the consideration for granting them, is the advantage which the public will derive from them, especially after the expiration of the patent monopoly, when the discoveries embodied in them shall become a part of the public stock of knowledge." *Beidler* v. *United States,* 253 U.S. 447, 453 (1920).[2]

The Court of Appeals' reversal of Judge Parsons' holding of invalidity is in direct conflict with this Court's decision in the *Beidler* case.

The law of the *Beidler* case should either be clearly reaffirmed at this time of overwhelming technological explosion and the Court of Appeals' error in this case remedied, or the present statute (35 U.S.C. 112) should receive a thorough reappraisal. Increased sophistication of subject matter has never been an excuse for relaxation of the disclosure requirements of our patent laws. And increased uncertainty of knowledge about a subject matter resulting in the increased sophistication of our learning—where we do not always understand what we know—should not be an excuse for relaxation of the disclosure requirements of our patent laws. Rather it should be a reason for more stringent disclosure requirements, *i.e.,* more disclosure rather than less.

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[2] Emphasis added throughout unless otherwise indicated.

CONSTITUTIONAL PROVISIONS AND STATUTES INVOLVED

This case involves Article I, Section 8, Clause 8, of the Constitution, and Section 112 of the Patent Code of 1952, 35 U.S.C. 112.[3]

The appeal also involves the "Due Process" clause of the Fifth Amendment to Constitution.

STATEMENT

The trial court held the patent not infringed and invalid. (Appendix p. 36a)

The Court of Appeals reversed—holding the patent valid and infringed. (Appendix p. 11a)

The Wallerstein patent in suit, Patent No. 2,531,999, relates to the making of crystalline dextrose, a sugar akin to table sugar, from starch using a special enzyme[4] catalyst. (P. Exh. 1)[5] Sugar of this type is used as a

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[3] 35 U.S.C. 112 in pertinent part reads as follows:

> "The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention."

[4] The following general definition of an enzyme was stipulated prior to trial:

> "Enzyme: Specific, cell-independent catalysts of biological origin, which are proteinaceous and can be destroyed by heating."

[5] The references to the record are to the record printed by the parties as appendices to their briefs in the Court of Appeals which are designated PA for Appendix to

pharmaceutical and as a sweetner in commercial food products in amounts totalling more than five hundred million pounds annually. (DA. 23, 55)

The Starch-To-Dextrose Process Was Very Old

Petitioner has been one of the principal producers of crystalline dextrose from starch for more than forty years. Until 1960, it used an acid to catalayze the conversion of corn starch to dextrose. (D.A. 22-23) In that year, it was the first producer to shift from the acid to an enzyme catalyst.[6] (P. Exh. 95) It was that change which triggered this litigation.

Enzyme Catalysis of The Reaction Was Also Old

The Wallerstein patent purports to describe and claim an improved starch-to-dextrose process which comprises substituting for the acid a special enzyme catalyst. (P. Exh. 1, col. 1) But as the Court of Appeals correctly stated:

> "The possibility of using an enzyme preparation to hydrolyze starch to dextrose was known as early as

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[5] (Continued)
Brief of Plaintiff-Appellant, P.Exh. for Appellant's Exhibit Volume and DA for Appendix to Brief of Defendant-Appellee. References to the appendix to this petition are (Appendix p, ...).

[6] Both acid and enzyme conversion of starch to dextrose are processes in nature. Both, for example, are part of the human digestive system. The acid process takes place in the stomach and the enzyme process is carried out by saliva in the mouth. These body processes produce dextrose, the form of sugar which can be used in the blood stream. It is for this reason that dextrose has widespread pharmaceutical use. Encyclopedia Brittanica Vol. 16, p. 649 (14th Ed. 1955).

1927. The difficulty encountered was to effect such a hydrolysis of starch on an economical commercial basis." (Appendix p. 4a)[7]

The Patent Said It Was An Improvement Over The Acid Process

The application for the patent was filed in 1947 and issued in 1950. It referred to the then commercial, acid process as the standard of reference and stated:

> "It is the object of this invention to effect the hydrolysis of starch under such conditions that crystallization is markedly facilitated, the production of undesirable by-products of little value minimized, and increased yields of dextrose are obtained." (P. Exh. 1, Col. 1, lines 25-30)

Prior to 1960, when petitioner switched from the acid-catalyzed process to one employing an enzyme catalyst of its own development, no one had been able to produce crystalline dextrose from starch by enzymes with any advantage over the acid process and there was, therefore, no commercial use of an enzyme catalyst in such process. Petitioner was able to do it only after years of research which culminated in two important discoveries now covered by its own patents. (PA. 306-309) The trial court found those discoveries and not the Wallerstein patent essential to the use of an enzyme catalyst in such process. (Appendix p. 22a)

Judge Parsons after fifteen days of trial found that:

> "In 1960, the defendant substituted enzymes for acid as a hydrolyzing agent. This would *not have resulted in the economic commercial production* of crystalline dextrose if the immediately preceding developments had not been made *by the defendant.*" (Appendix p. 25a)

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[7] PA. 299; DA. 101, 127, 128

Those developments were *defendant's* new enzyme preparation and a method of separating the needed enzyme from an interfering enzyme called transglucosidase which occurs naturally therewith. (PA. 170, 175, 304-5; P. Exh. 186-197; Petitioner's Patents Nos. 3,012,944 and 3,042,584)

The Trial Court Found the Patent Discloses Only What The Enzyme Does— Not What It Is Or How To Produce It

Each of the claims of the Wallerstein patent calls for the reaction to be performed in the presence of an enzyme defined only in these terms:

> ". . . a microbiological enzyme preparation having a starch-glucogenase activity equivalent to an initial reaction value 'k' of at least 1.0. . .".

The "k" value is a number coined by Wallerstein to characterize an enzyme in terms of the amount of starch converted to sugar in a given length of time. (PA. 183, 567) It is a functional measure of the ability of an enzyme preparation to convert about 50 percent of starch to sugar in about half an hour. (PA. 125, 126; P. Exh. 2) It tells nothing of the identity or source of the enzyme preparation, only its functional ability—potency—in the starch-to-dextrose reaction. (PA. 117, 258, 399, 401-403, 566-568, 570, 598; DA. 45) In effect it says only "use an enzyme that works".

The trial court found that the patent utterly failed to disclose the identity of such enzyme or its method of preparation:

> "I am convinced from the testimony at the trial that this description of the 'k' value of the enzyme preparation is not described so as to provide one skilled in the art 'full, clear, concise, and exact'

directions as to *how to make an enzyme preparation with the potency needed for the successful practice of the process Wallerstein attempted to patent.*" (Appendix p. 29a-30a)

• • •

"In addition to the lack of specificity referred to already, the patent fails to identify the enzyme preparation employed in Examples 1 to 5 of the patent specification. *Nowhere throughout the specification or claims is there any identifiable enzyme preparation disclosed.*"

• • •

"*. . . there is no positive statement which indicates the specific microorganism used by the inventor.*" (Appendix pp. 34a, 35a)

The Court of Appeals did not even address itself to such findings. It did not say they were clearly erroneous. Yet it reversed Judge Parsons' holding of invalidity.

The Justification For A Switch From Acid To Enzyme Was Economics— While The Court Of Appeals Seems To Have Recognized This, Its Decision Is Inconsistent Therewith

The incentive for switching from acid to the enzyme process was cost reduction—economics. (Appendix p. 9a, 15a; PA. 309, 441, 442; P. Exh. 5, 61, 150, 173)

The Court of Appeals in addition to recognizing that enzyme catalysis for this purpose was known in 1927, acknowledged that:

"The difficulty encountered was to effect such a hydrolysis of starch on an economical commercial basis." (Appendix p. 4a)

But the Court of Appeals ignored the fact that no one had greater incentive in 1950 than the petitioner to adopt

an improvement over the acid process—if it were an improvement—and that it took almost ten years of petitioner's own research after the Wallerstein patent issued before it realized that goal. (PA. 306-309, 312)

In view of this, there was, to say the least, a need for the Court of Appeals to consider the trial court's findings and petitioner's evidence that the Wallerstein patent is invalid because neither the patent nor any other source of scientific information held the answer to how enzymatic hydrolysis could be made economically feasible *until petitioner—after years of its own research—succeeded in doing so in the late 1950's.* This the Court of Appeals failed to do.

The Court of Appeals demonstrated a second time its apparent recognition of the commercial facts of life—that irrespective of prior art on enzyme hydrolysis of starch, unless some *economic advantage* were achievable, there was no incentive for a crystalline dextrose manufacturer to switch from hydrochloric acid to enzyme—but casually dismissed the point:

> "Apparently the only reason defendant did not earlier change from acid hydrolysis was the cost involved and the difficulty in obtaining the enzyme needed." (Appendix p. 9a)

The word "only" is deceptively pregnant when one focuses on the facts that some twenty-three years had elapsed (from 1927 when enzyme hydrolysis of starch to dextrose was clearly taught in the art)[8] before the Wallerstein patent issued in 1950, and that yet another ten years expired before petitioner—who knew of the patent shortly after it issued—could begin the accused process. Since petitioner was one of the principal pro-

[8] DA. 127

ducers of crystalline dextrose at the time the patent issued and for almost three decades before (and had, indeed, experimented with enzyme catalysis for the purpose both before and after it issued)[9] the incentive to use an enzyme catalyst if it offered a commercial advantage, was obviously present in 1950.

Moreover, while the Court of Appeals recognized that Wallerstein's business was selling enzymes (Appendix p. 4a), it ignored the significance of the fact that neither he nor his company ever attempted to sell an enzyme for dextrose production or ever approached petitioner—one of the most likely customers—to sell an enzyme for the purpose or to attempt to interest it in the alleged invention until after petitioner had developed its own commercial enzyme process in 1960. (PA. 127, 133, 139) The irony is plain. Respondent—a pharmaceutical company which bought Wallerstein's company and its patent in 1958 and which has contributed even less than Wallerstein—now stands athwart petitioner's path and demands a toll on a process which the trial court said neither the patentee Wallerstein nor respondent Baxter had a thing to do with.[10]

The Trial Court Found Wallerstein's Patent Was Not The Basis For Petitioner's Process

Judge Parsons' decision after trial carefully evaluated the relation of the prior art on enzyme hydrolysis of starch to dextrose and petitioner's extensive research in the field leading up to its 1960 switch to enzyme catalyst along with the expert testimony as to what

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[9] PA. 312; DA. 163

[10] The trial court found Wallerstein to be a "paper patent" entitled to but limited scope at best. But again the Court of Appeals simply disagreed. (Appendix p. 9a, 14a)

information could, in fact, be derived from the disclosure of the patent. His explicit findings on those vital questions have been quoted above.

Judge Parsons also found in detail as to the reasons why it was more than thirty years after knowledge that enzymes could catalyze the starch to dextrose reaction before the use of such a catalyst offered any commercial advantage over acid in a crystalline dextrose process.

"* * * In about 1949, the defendant's research laboratory investigated the commercial feasibility of employing enzymatic conversion of starch with commercially available enzyme preparations as a substitute for acid conversion in their process of producing crystalline dextrose. This conversion produced 83% dextrose (dry basis), corresponding to a crystalline dextrose yield of 62%. This new process was not then competitive with acid conversion.

"Further research and investigation brought about improvement in enzyme production around 1954 by improvement in nutrient solution which increased enzyme yield (GA units per milliliter) by a factor of about 9 and increased dextrose content to 90% and crystalline yield to 78%. By 1956, the improvement to enzyme production had more than doubled the 1954 figure of GA units per milliliter. The dextrose content dropped slightly to 86% and the crystalline dextrose yield was 69%.

"The study of enzyme preparations for starch hydrolysis to dextrose conducted by the research department of Corn Products Company revealed the injurious effects of transglucosidase."

* * *

"I am satisfied from the evidence produced at the trial that the process employed by the defendant could not result in the economic commercial production of crystalline dextrose if a purified enzyme were not employed. *In other words, if the defendant did not treat the enzyme they employ so as to remove*

the transglucosidase activity, the results they achieve would not be superior to the acid conversion process which they had employed in the past."

• • •

"The defendant's process employs two important inventions which provide: (1) transglucosidase removal by an inexpensive absorption process, (Kooi et al 3,042,584), and (2) a microorganism that produces enzyme at a lower cost and with better glucamylase to transglucosidase ratio (Armbruster 3,012,944). Without at least the first of these inventions, defendant could not have gone into the production of crystalline dextrose by enzyme conversion." (Appendix pp. 23a-26a)

The Court of Appeals Demonstrated A Total Disregard For Judge Parsons' Findings Plus An Unexplained Bias Against Petitioner

In the face of the trial court's explicit findings that one skilled in the art could locate in the patent neither a usable enzyme nor directions on how to make one and despite Judge Parsons' further determination that petitioner had to experiment for years and make two important discoveries of its own in order to achieve a commercially useful enzyme process (Appendix p. 26a, 30a), the Court of Appeals' opinion—from the outset—reflected an unexplained and unexplainable attitude that the accused process was simply lifted from the patent:

"When the Wallerstein patent was issued, defendant's engineers and scientists read it and understood it."[11]

• • •

[11] This was true, but only in the sense that the reader of Jules Verne "understood" his writings. When someone finally reaches the moon, Verne will neither deserve nor receive the credit. A valid patent must be more than science-fiction or a mere statement of a desired goal.

"They [petitioner] experimented and tried the process and it worked."

• • •

"As plaintiff amply describes it, Wallerstein laid the road. The defendant drove over it." (Appendix p. 8a)

The Court of Appeals persisted along such a vein even though it found that the patent issued in 1950 but that petitioner—a very large producer of crystalline dextrose—had not even tried the alleged process until four years later:

"Answers to interrogatories indicated that defendants [sic] tested the procedure as early as 1954." (Appendix p. 8a)

As a matter of actual fact, the answer to the interrogatory does not say, as the Court of Appeals implies, that the petitioner ever carried out the process of the patent. (P. Exh. 95) To the contrary, the evidence is clear that petitioner never attempted that until this suit was brought and that it then could not determine what enzyme to use.[12] What petitioner did in 1954 was carry out a dextrose-from-starch process using an enzyme obtained from A. E. Staley & Co. (P. Exh. 9, 22)[13] as to which it was concluded by petitioner in 1954 the process

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[12] No one has been able to reproduce the examples of the process given in the patent. (PA. 164, 568) The enzyme preparations used by the patentee were secret, identified only by code names. They and their methods of preparation were trade secrets. Their identity was not known to the patentee's co-workers. (PA. 115, 117-119, 137-138) The patentee, Walllerstein, is dead. With him perished the details of the enzyme preparation.

[13] Staley & Co. had been using enzymes to convert starch to dextrose since about 1939 for commercial production of syrups. It started manufacture and sale of crystalline dextrose in about 1966. (PA. 184)

lacked commercial advantage over the acid process. (P. Exh. 147-150)

The Court of Appeals thus ignored the significance of the chronology it had itself expressed and reached a conclusion wholly inconsonant therewith. Although recognizing that petitioner, one of the largest crystalline dextrose producers for decades before the patent issued, first read the patent in 1950 (P. Exh. 172) and experimented with enzyme catalysis in 1954 (P. Exh. 108) but that it did not begin the accused process until 1960 (P. Exh. 95), it nevertheless wrote an opinion which would make it appear that petitioner had, upon issuance of the patent simply copied its process from the patent. The Court reached conclusions which would only make sense if the ten year lapse and the extensive research by petitioner had not occurred. The Court so telescoped those ten years between 1950 and 1960 as to make it appear that petitioner picked up the patent, read it, and immediately began using the process. The trial record is replete with evidence as to why neither petitioner nor anyone else could derive an economically useful process from the face of Wallerstein's patent. (PA. 309, 441, 442, 472; P. Exh. 5, 61, 150, 173)

REASONS FOR GRANTING THE WRIT

Section 112 and its predecessors have always provided that a patent shall contain a full description of the invention and that the same shall particularly point out and distinctly claim the invention. While this Court gave extensive consideration in 1946 to the claiming aspect of such statute in *Halliburton Co.* v. *Walker,* 329 U.S. 1 (1946), and such decision resulted in what is the third paragraph of the present statute (as revised in 1952), it has been since 1934 in *Stelos Co.* v. *Hosiery Corp.,*

295 U.S. 237, that the Court has given any consideration to the disclosure requirements of the statute and since 1920 that this Court has expressed itself on this vital aspect of patent law. *Beidler* v. *United States,* 253 U.S. 447 (1920)

In the light of the trial court's unequivocal findings of inadequate disclosure, the Court of Appeals' reversal of the holding of invalidity reflects either a flagrant disregard of those findings or a complete rejection of the law of *Beidler* v. *United States, supra.*[14]

Here, in a chemical process for converting starch to dextrose, the two courts below have each recognized the fact that patentability depended upon the use of a special enzyme. The trial court found explicitly that the patent not only failed to disclose how to obtain that special enzyme but that the patentee had failed to disclose the identity of a single enzyme used by him. The Court of Appeals did not determine those findings to be erroneous but apparently concluded that enzymes were exempt from the requirement of full disclosure because:

> "Modern science has not been able to chemically define enzymes. They are usually described by what they do, not by what they are." (Appendix p. 5a)

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[14] The concurring opinion of Mr. Justice Frankfurter and the dissenting opinion of Mr. Justice Burton disagreed on the requirements of the patent disclosure relating to microorganisms in *Funk Bros. Seed Co.* v. *Kalo Inoculant Co.,* 333 U.S. 127 (1948). The majority of this Court did not reach that question, holding instead that the subject matter of the patent was a product of nature and not patentable. The application of 35 U.S.C. 112 to the issues of the present case is thus still open.

and reversed the trial court's holding of invalidity.[15]

Symptomatic of the treatment given the trial court's findings and the evidence is this statement of the Court of Appeals—again in the face of unequivocal findings of the trial court that neither an enzyme nor its method of preparation was disclosed in the patent:

> "It is true that defendant's scientists discovered a more economical method to purify the niger enzyme by absorption of transglucosidase on bentonite clay. However, the enzyme is as described in Wallerstein."

There is absolutely no reference in the patent to a "niger enzyme" or to a method of purifying any enzyme, or to any method which might, even accidentally, remove transglucosidase or, indeed, was there anything which even suggested that the enzyme should be purified. (PA. 38, 117, 401, 403, 411-413, 419-420, 559, 568, 588, 589; DA. 45, 167) Judge Parsons found flatly that "k" value is not increased by removal of transglucosidase. (Appendix p. 23a) What was "described in Wallerstein" was nothing more than that an appropriate enzyme was one to be selected from some unnamed strain of the thousands of strains of Aspergillus mold which would produce the desired dextrose at a given rate, *i.e.*, would have the "k" value of the patent. This disclosure amounts to nothing more than an invitation to experiment. (PA. 588, 589) It is a matter of record that petitioner experimented for almost ten years after the patent issued before finding the answer to a commercially useful process.

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[15] The patentee could, however, have described the enzyme in other ways such that it would have been reproducible. See *Merck & Co.* v. *Chase Chemical Company*, 273 F. Supp. 68 (D.N.J. 1967). It is clear that the patent does not "set forth the best mode contemplated by the inventor of carrying out his invention." 35 U.S.C. 112

If The Court of Appeals Is Said To Have Accepted The Trial Court's Findings Of Inadequate Disclosure, It Erred In Holding That To Be No Impediment To Validity

The court below justified ignoring the trial court's unequivocal findings of inadequate disclosure in these words:

> "Modern science has not been able to chemically define enzymes. They are usually described by what they do, not by what they are." (Appendix p. 5a)

This statement is misleading at best and at worst is completely wrong. It nevertheless emphasizes the nature of the grave error into which the court has fallen.

If one assumes that enzymes can, in fact, only be defined functionally, *i.e.*, by what they do, it is clear from at least a hundred years of this Court's decisions that a patent which relies for its very novelty on the use of a special kind of enzyme simply cannot be valid. *Wood* v. *Underhill, et al.*, 46 U.S. 4 (1847). If, on the other hand, one assumes—quite apart from the question of what an enzyme is—that it is certainly possible to describe how to *produce* a specific enzyme (an assumption the record fully justifies, DA. 129-132, 113-121, 122-126) so that the public could follow the instructions, then it is equally clear that a patent which fails to do so is invalid under 35 U.S.C. 112. Any argument that the functional "k" of at least 1 was all the knowledge one skilled in the art would need is directly refuted by the evidence.[16] (PA. 169, 416; P. Exh. 151-152)

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[16] As to the significance of the "k" value, Judge Parsons found (Appendix p. 23a):

> ". . . results of experiments produced by the defendant at the trial demonstrated that increasing the 'k' value by precipitation did not remove transglucosidase nor increase dextrose yields. They also estab-

Here the Court of Appeals seems to have become so imbued with the idea that petitioner had, in effect, copied its process directly from the patent—despite the fact that the patent issued in 1950, that, by the Court's own chronology, petitioner learned of it immediately, but did not even try it until some time in 1954,[17] and did not adopt an enzyme catalyst until 1960 (ten years after the patent issued)—that it has failed to apply long-standing precedents and principles.

This Court in 1847, in *Wood* v. *Underhill, et al., supra,* expressed the governing principles which are as vital today as when first enunciated. There, the Court stated that if an alleged improvement "cannot be used with advantage . . . without first ascertaining by experiment . . ." how the invention is to be carried out:

> ". . . then the invention is not patentable. Because, by the terms of the act of Congress the inventor is not entitled to a patent unless his description is so full, clear, and exact as to enable any one skilled in the art to compound and use it."

and then went immediately on to express these legal truisms:

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[16] con't.

lished that removal of transglucosidase did not substantially change the 'k' value. It was shown that removal of transglucosidase from the enzyme preparation resulted in raising the dextrose content of the hydrolyzate beyond the value which could be attained by use of the enzyme preparation from which transglucosidase had not been removed."

[17] The uncontroverted evidence at trial was that petitioner never tried "it" until after suit and then could not operate it because it could not determine the identity of Wallerstein's enzyme. What it had tried in 1954 was an uneconomical process based on an enzyme received from the A. E. Staley Co. (P. Exh. 22, 150)

> "And if from the nature and character of the ingredients to be used, they are not susceptible of such exact description, *the inventor is not entitled to a patent.* * * * And whether the fact is so or not is a question to be decided by a jury. . .".

Here, the Court of Appeals either accepted the trial court's findings and went wrong as a matter of law or usurped the function of the trial court on this vital fact issue without even addressing itself to the evidence underlying the court's findings or to the findings themselves. An erroneous decision had been reached, in either event.

If the Court of Appeals Is Said to Have Ignored The Trial Court's Findings And Therefore Its Responsibilities Under Rule 52, It Has Deprived Petitioner Of Due Process

Aside from a brief opening reference to the trial court's conclusion that the patent was invalid for failure to satisfy the requirements of 35 U.S.C. 112, the Court of Appeals' decision is remarkably devoid of reference to the findings of fact which underlay such conclusion. The Court of Appeals, indeed, discusses the matters bearing on validity as though the case were tried by it *de novo*—without any apparent recognition of its obligations under Rule 52.

Moreover, even in what appears to be a recounting of the undisputed facts, the Court of Appeals laced those "facts" with such obvious preconceptions as to make it clear that the very heart of Judge Parsons' findings had been rejected from the outset. The court never dealt directly with the critical findings or gave any reason for apparently ignoring them.

Judge Parsons found from the evidence at trial that respondent's patent failed to disclose the identity of a

single enzyme useful in the process or how to prepare the same. But the Court of Appeals skipped over that matter as though there were no dispute on the point:

> "The patent in suit discloses and claims as invention the basic steps necessary to the successful enzyme hydrolysis of starch. . .". (Appendix p. 6a)

Such use of the term "successful" in this statement at the threshhold of its opinion is symptomatic of the Court of Appeals' erroneous approach and, indeed, of its total disregard of the trial court's findings.

Rule 52(a) should be given particular weight where expert testimony must of necessity play an important role. Here the trial court had an opportunity not only to hear the qualifications of the experts but also from their demeanor and responses to form its opinion as to their credibility. The importance of this opportunity to observe where technical or scientific problems are before the court, as here, has been succinctly stated by this Court in *Graver Tank & Mfg. Co.* v. *Linde Air Products Co.*, 339 U.S. 605 (1950):

> "Like any other issue of fact, final determination requires a balancing of credibility, persuasiveness and weight of evidence. It is to be decided by the trial court and that court's decision, under general principles of appellate review, should not be disturbed unless clearly erroneous. Particularly in this so in a field where so much depends upon familiarity with specific scientific problems and principles not usually contained in the general storehouse of knowledge and experience." (pp. 609, 610)
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> • • •
>
> "It is not for this Court to even assay an independent evaluation of this evidence. This is the function of the trial court. And, as we have heretofore observed, 'To no type of case is this . . . more appropri-

> ately applicable than to the one before us, where the evidence is largely the testimony of experts as to which a trial court may be enlightened by scientific demonstrations.' * * * 336 U.S. 271, 274-5." (p. 611)

Moreover, in this instance the Findings of the District Court were of its own composition. Petitioner was chagrined, indeed, when the District Court observed in its opinion that:

> "I have found the defendant's proposed findings of fact and conclusions of law rather unhelpful." (Appendix p. 27a)

It was not for the Court of Appeals to make an independent assay of the evidence. Wanting the knowledge requisite to make its own appraisal of what the patent specification disclosed, it necessarily had to depend upon the expert's testimony. The issue of the adequacy of a disclosure has from the earliest decisions been a question for the jury. *Wood* v. *Underhill*, 46 U.S. 1 (1847).[18]

The expert testimony was unequivocal, and, indeed, uncontroverted that with the patent before him "*extensive experimentation*" was required to have produced an enzyme having the function of "k of at least 1". (PA. 588) By "extensive experimentation" petitioner's expert meant: "Essentially original discovery, trial and error . . ". (PA. 589)

Rule 52 of the Federal Rules of Civil Procedure expressly proscribes just such an appellate review as was given here. Litigants are entitled to rely upon the knowledge that the trial judge's findings based upon live expert

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[18] *Evans* v. *Eaton*, 7 Wheaton 356, 428, 20 U.S. 356 (1822); *Hogg et al.* v. *Emerson*, 47 U.S. 437, 483 (1848); *Adamson* v. *Gilliand*, 242 U.S. 350, 353 (1917).

witnesses will stand unless the same are clearly erroneous. Here the key findings, on which consistent decisions of this court require a holding of invalidity, have not been held to be erroneous yet the trial court's judgment of invalidity has been reversed.

Billions of pounds of crystalline dextrose have been produced by the enzyme process since 1960. If this erroneous decision is permitted to stand, the industry, including petitioner, will be forced to account for its manufacture of vast quantities of this *unpatented commodity* by a process which the trial court found was *undisclosed in the Wallerstein patent.* If the mandate of the Court of Appeals is permitted to issue, a grievous wrong will be perpetuated and respondent will be permitted to exact tribute without due process of law.

SUMMARY

The trial court held that the Wallerstein patent for an allegedly improved enzyme-catalyzed process for converting starch to a form of sugar, called crystalline dextrose, was invalid after finding that it failed to contain a description in such full, clear, concise and exact terms as to enable a person skilled in the art to use it to obtain the alleged improvement.

An essential element of the process is the special enzyme preparation, obtained from living organisms, which is used in the process. Neither the identity of the particular organisms, the enzyme nor the procedure for obtaining a suitable enzyme preparation is disclosed in the patent.

The petitioner—a major crystalline dextrose producer for the last forty years—was able to achieve an improved

enzymatic process only after years of experiment and research, including the discovery of two patented advances of its own, and switched commercially from acid to enzyme catalysis of the process in 1960, ten years after issuance of the Wallerstein patent.

The Court of Appeals reversed, holding the Wallerstein patent description was adequate as a matter of law for the reasons that the enzyme preparation cannot be defined chemically. The Court of Appeals did not address itself to the trial court's findings of inadequate disclosure and did not hold them to be erroneous. Such disregard of findings of fact is a denial of *due process.*

The decisions of this Court under Section 112 of the Patent Statute have dealt most often with the scope of the monopoly claimed by a patentee, and in a relatively few instances with the adequacy of a patent description in mechanical and composition of material cases.

The Court of Appeals in this case has applied a rule of law in direct opposition to the law of this Court in those instances, particularly as announced in *Wood* v. *Underhill, et al.,* 46 U.S. 4 (1847), and *Beidler* v. *United States,* 253 U.S. 447, 453 (1920). The Court should consider and determine the application of the Patent Statute to the disclosures of patents in the advanced technology of today to prevent the burden of a patent monopoly on commerce without a disclosure which will, in fact, enrich the storehouse of public knowledge.

CONCLUSION

For the reasons stated, the petition for writ of certiorari should be granted.

Respectfully submitted,

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APPENDIX A

PATENT ACT, 35 U.S.C.

§112. Specification

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention. A claim may be written in independent or dependent form, and if in dependent form, it shall be construed to include all the limitations of the claim incorporated by reference into the dependent claim.

An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof. (Amended July 24, 1965, Public Law 89-83, sec. 9, 79 Stat. 261.)

FEDERAL RULES OF CIVIL PROCEDURE

Rule 52 (a)

In all actions tried upon the facts without a jury or with an advisory jury, the court shall find the facts specially and state separately its conclusions of law thereon, and judgment shall be entered pursuant to Rule 58; and in granting or refusing interlocutory injunctions

the court shall similarly set forth the findings of fact and conclusions of law which constitute the grounds of its action. Requests for findings are not necessary for purposes of review. Findings of fact shall not be set aside unless clearly erroneous, and due regard shall be given to the opportunity of the trial court to judge of the credibility of the witnesses. The findings of a master, to the extent that the court adopts them, shall be considered as the findings of the court. If an opinion or memorandum of decision is filed, it will be sufficient if the findings of fact and conclusions of law appear therein. Findings of fact and conclusions of law are unnecessary on decisions of motions under Rules 12 or 56 or any other motion except as provided in Rule 41(b).

APPENDIX B

IN THE

UNITED STATES COURT OF APPEALS

FOR THE SEVENTH CIRCUIT

No. 16421 SEPTEMBER TERM 1967—APRIL SESSION 1968

BAXTER LABORATORIES, INC.,
Plaintiff-Appellant,
v.
CORN PRODUCTS COMPANY,
Defendant-Appellee.

Appeal from the United States District Court for the Northern District of Illinois, Eastern Division.

May 1, 1968

Before HASTINGS, *Chief Judge,* DUFFY, *Senior Circuit Judge, and* CUMMINGS, *Circuit Judge.*

DUFFY, *Senior Circuit Judge.* Plaintiff is the owner of Wallerstein U.S. Patent No. 2,531,999, issued November 28, 1950, based on an application filed October 13, 1947. The term of this patent expired on November 28, 1967. The patent is on a method of converting ordinary plant starch to crystalline dextrose. The process is generally characterized as an "enzyme hydrolysis" of starch. Plaintiff sued defendant for infringing this patent, and defendant filed a counter-claim praying for a declaratory judgment that patent No. 2,531,999 is invalid.

The trial court found the patent invalid for failure to satisfy the requirements of 35 U.S.C. § 112. The Court stated: "The specification of the Wallerstein patent is

not written in 'full, clear, concise and exact terms' " as required by the statute. However, on the assumption that the Wallerstein patent is valid, the Court found ". . . defendant's process does not infringe the process claimed by the Wallerstein patent. It does not come within the claims of the Wallerstein patent and does not operate in the same manner. It obtains a different result through different means."

Plaintiff is engaged in the manufacture and sale of pharmaceutical supplies and continues the business of the Wallerstein Company in the manufacture and sale of enzyme preparations. Defendant Corn Products Company is a manufacturer of products derived from corn including the manufacture of crystalline dextrose which it sells the trade-name "Cerelose."

Dextrose is a chemical substance of the class of carbonates. It has a sweet taste and has a high nutritive value. Dextrose is sometimes called "corn sugar." Crystalline dextrose is manufactured from corn starch or some other plant starch by a crystallized chemical change known as hydrolysis. It is a relatively pure form of dextrose. It is to this particular product that the Wallerstein patent relates.

The hydrolysis of starch to dextrose using acid as a catalyst was conceived as early as 1811 by the Russian scientist Kirchoff. He produced a dextrose syrup which could be used as a liquid syrup or reduced to dry form as crystals or as a solid slab.

The possibility of using an enzyme preparation to hydrolyze starch to dextrose was known as early as 1927. The difficulty encountered was to effect such a hydrolysis of starch on an economical commercial basis.

In the process of hydrolysis, starch usually is suspended in a relatively large amount of water. This starch suspension is frequently referred to as "substrate." Since the starch chains molecule is relatively stable, the process of hydrolysis does not readily occur. A catalyst is required to initiate and assist the reaction. An acid or an enzyme

may be added to the substrate. The reaction then proceeds through the initial thinning of the starch to the final formation of the dextrose molecules. The resulting "hydrolyzate" is a liquid solution which contains small amounts of reversion products and the residual acid or enzyme.

For commercial purposes, the dextrose is recovered from the hydrolyzate in one of three forms. It can be an ingredient of syrup or solidified into so-called "slab sugar", or the crystals of dextrose may be recovered apart from the other substances.

The enzymes mentioned in this case are derived from fungi (molds). They excrete through their cell walls enzymes of various digestive abilities or activities. A large number of enzymes of "activities" are produced by a culturing of a single kind of mold such as Aspergillus oryzae or Aspergillus niger. Among these activities is an amylase, which hydrolyses starch to dextrose.

Modern science has not been able to chemically define enzymes.[1] They are usually described by what they do, not by what they are.

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[1] Definitions of "Enzyme", "Enzyme Preparation having Starch-Glucogenase Activity" and "Transglucosidase" were stipulated as follows:

"Enzyme: Specific, cell-independent catalysts of biological origin, which are proteinaceous and can be destroyed by heating."

"Enzyme Preparation having Starch-Glucogenase Activity: Any enzyme-containing substance which gives a positive value when subjected to the procedure and calculations described in U.S. 2,531,999, column 3, lines 14 to 51."

"Transglucosidase: An enzyme which produces non-fermentable sugars, e.g., isomaltose and panose, from some starch hydrolysis products."

Leo Wallerstein and his brother founded a brewing consulting laboratory shortly after 1900. Within a few years, they discovered an enzyme which prevented bottled beer from turning cloudy. They founded the Wallerstein Company to market the new product.

After the coming of prohibition, they developed enzymes useful in the textile, leather, baking and other industries. Their company merged with Baxter Laboratories in 1958.

Leo Wallerstein became interested in the use of enzymes to make crystalline dextrose. In the 1940's, he began experiments which led to the invention of the patent in suit.

The fundamental of starch conversion was well known. The deficiencies of acid hydrolysis in producing limited yields of dextrose with relatively high concentration of taste and color imparting reversion products was also recognized.

The patent in suit discloses and claims as invention the basic steps necessary to the successful enzyme hydrolysis of starch to produce a dextrose hydrolyzate of such character that discrete crystals of dextrose may be readily obtained.

It is apparent that Wallerstein knew that the formation of excessive reversion products during the reaction prevented the production of a hydrolyzate suitable for making crystalline dextrose.

In order to increase the yield of dextrose and to facilitate crystallizing, Wallerstein departed from the teachings of prior workers in this field. The patent teaches that no preliminary treatment whatsoever is required prior to adding the enzyme, although for economic reasons some preconversion or acid thinning is desirable. Wallerstein explains that it should be kept to a minimum and that with lesser treatment there will be higher yields of dextrose.

Prior enzyme researchers such as Dale and Langlois had urged preliminary thinning to a dextrose equivalent

(DE) of between 40% and 60%. Wallerstein prefers to keep it below a DE of 30%, and gives examples of lower DE thinning and, in one instance, of none at all.

The patent further teaches that an enzyme of specified minimum potency should be used. Such potency is termed in the patent as "starch-glucogenase" activity.

The patentee defines the potency of the enzyme in terms of its initial reaction velocity "k" and sets forth a formula and analytical procedures for its determination. The patent states the enzyme should have a starch-glucogenase "k" value of "at least 1.0."

The patent in suit was called to the attention of the defendants by its firm of consulting engineers within a month after it had issued. Defendant's Research Department commented that the new process ". . . should be thoroughly investigated before any conclusion can be drawn regarding the economic potentialities of the process."

On June 19, 1954, defendant's Research Department wrote: "A patent recently issued to Wallerstein, U.S. Patent 2,531,999 covering . . . a process which I have always felt would some day be of industrial importance, particularly to our company. The process is limited somewhat . . . by the cost of available enzymes and the unavailability in industrial quantities of most suitable enzymes. . . ."

The commentary pointed out that Aspergillus oryzae is a costly source of the enzymes, and suggested the use of other fungal sources which had been discovered since Wallerstein's invention.

Later, defendant began limiting the preliminary thinning of the starch so as to preclude formation of substantial reversion products prior to the enzyme hydrolysis. The use of "low DE substrates" brought about substantial improvements in the yield of dextrose. As the extent of such pre-treatment was lessened, the extent of final conversion to dextrose was increased. Furthermore, defendant began to purify its enzymes to at least the minimum

potency described in the patent. Enzymes from various fungal sources were used. The more economical Aspergillus niger strains were preferred.

Defendants argue that the alleged invention is invalid because it is obvious in view of the prior art. On the other hand, defendant also argues that the patent is so vague that it violates 35 U.S.C. § 112 and also, that it is so vague as to render it meaningless to one skilled in the art. We disagree. We hold that the patent is not invalid for either reason.

When the Wallerstein patent was issued, defendant's engineers and scientists read it and understood it. They experimented and tried the process and it worked. Answers to interrogatories indicate that defendants tested the procedure as early as 1954.

It is true that defendant's scientists discovered a more economical method to purify the niger enzyme by the absorption of transglucosidase on bentonite clay. However, the enzyme is as described in Wallerstein.

Defendants strongly urge that the discovery of the role of transglucosidase was theirs. However, it appears from defendant's own reports that credit for the discovery of transglucosidase in these fungal sources should go to Pazur, French and others, whose data came into public literature in 1950-1952.

The correct statement of the situation would be that while the enzyme is as described by Wallerstein, the source and the method of procuring it has been improved by defendant and others. As plaintiff amply describes it "Wallerstein laid the road. The defendant drove over it."

Wallerstein's own laboratory experiments proved the success of his process. By use of enzymes as a catalyst, he obtained higher yields of crystalline dextrose. The production of objectionable reversion products was minimized.

Apparently the only reason defendant did not earlier change from acid hydrolysis was the cost involved and the difficulty in obtaining the enzyme needed.

We have considered additional arguments of invalidity made by defendant. Nevertheless, we hold that the claims of the patent in suit here in issue are valid.

As to infringement, defendant refers to the patent in suit as a paper patent which should be narrowly and strictly construed. However, failure by a company not in the business of converting starch or producing crystalline dextrose, to spend large sums for equipment and possibly new buildings, should not be the basis for describing the patent as a paper patent. See *Coltman* v. *Colgate-Palmolive Peet Co.*, 104 F.2d 508, 511 (7 Cir., 1939); *Aerosol Research Co.* v. *Scovill Manufacturing Company*, 334 F.2d 751, 756 (7 Cir., 1964); *Briggs et al.* v. *M. & J. Diesel Locomotive Filter Corp. et al.*, 342 F.2d 573, 577 (7 Cir., 1965).

It is erroneous to say, as does the District Court's decision, that defendant's process does not come within the claims. In our view, defendant's process reads squarely on the process described in the patent. We think it was also incorrect to say that defendant gets a different result through different means. We think defendant obtains the result which Wallerstein described.

The District Court's opinion states: "Since the Wallerstein patent claims a process for the production of crystalline dextrose in a better manner than the acid conversion then employed, and mentions nothing about the removal of transglucosidase from the enzyme employed, the defendant's process is not that of the Wallerstein patent."

It was, apparently, an important consideration in the opinion of the District Court, that the patent did not mention by name the removal of transgulcosidase from the enzyme. It is true that the name transglucosidase was not used, but in 1947, neither Wallerstein nor anyone else knew of the presence of transglucosidase in his enzyme.

The object of the patent in suit was to effect hydrolysis under such conditions that

a) "crystallization is markedly facilitated;"

b) "the production of undesirable by-products of little value minimized"; and

c) "increased yields of dextrose are obtained."

In 1954, defendant, after studying the Wallerstein patent, obtained these objects and did so before it invented an improved enzyme and before removing transglucosidase.

To illustrate the state of the art, defendant's expert, Earl R. Kooi, director of Exploratory Research at Corn Products Co., in 1954, observed as to crystallization "Just why crystallization of dextrose from an enzyme-converted liquor should be so much more rapid than crystallization from an acid-converted liquor is difficult to understand."

We conclude that defendant's commercial process utilizes the *principle* of the Wallerstein invention and achieves the *result intended* by that invention. In its process, defendant limits its pre-treatment of the starch to a low DE and it purifies its enzyme to a "k" of at least 1.0.

We think the proof on the trial demonstrated that in the Wallerstein process it makes no difference whether the dry enzyme is dissolved in one part or thirty parts of water prior to subjecting the starch to it. The results would be no different if the dry enzyme powder was stirred directly into the starch-conversion tanks which hold thousands of gallons of water.

We agree with plaintiff that the "k" value specified by Wallerstein must be determined on the basis of the solid material and not on the basis of solids diluted by water.

Defendant makes a serious charge which is found too often in patent litigation. It argues that the patent in

suit is unenforceable because it was procured by misrepresentation.

As we understand the charge, defendant says Wallerstein's patent solicitor was wrong when he characterized the "k" value of the patent as a "quantitative" expression of the activity of the enzyme. Defendant now says that "k" is a "qualitative" measure of activity and infers that the solicitor misled the patent office.

What is important is that those reading the patent application are fully advised of what "k" means and how it is determined. The District Court found that the "k" method of determining the potency of the enzyme is set out in the patent in "such 'full, clear, concise and exact terms as to enable any person skilled in the art' to likewise measure and determine the potency. . . ." We agree!

We hold that no misrepresentation was made, and that there is nothing in the record to show that the Patent Office Examiner was misled.

Due to the unfortunate length of this opinion, we have not discussed several additional arguments presented by defendant. We have considered the same and are unable to agree with such contentions.

We hold that the claims of the Wallerstein patent in suit here in issue are valid and that such claims are infringed by defendant's process.

The judgment of the District Court is reversed and the cause is remanded for further appropriate proceedings consistent with this opinion.

REVERSED and REMANDED.

APPENDIX C

In The
UNITED STATES COURT OF APPEALS
For The Seventh Circuit
Chicago, Illinois 60604
Friday, June 7, 1968
Before
Hon. F. Ryan Duffy, Senior Circuit Judge
Hon. John S. Hastings, Circuit Judge
Hon. Walter J. Cummings, Circuit Judge

No. 16421

Baxter Laboratories, Inc., *Plaintiff-Appellant,* v. Corn Products Company, *Defendant-Appellee.*	Appeal from the United States District Court for the Northern District of Illinois, Eastern Division.

It is ordered by the Court that the petition for rehearing of this cause be, and the same is hereby, Denied.

APPENDIX D

IN THE UNITED STATES DISTRICT COURT

• • Caption No.—62 C 1757 • •

MEMORANDUM OPINION AND ORDER

Baxter Laboratories, the plaintiff in this case, is a Delaware corporation having its principal place of business in Morton Grove, Illinois. Their complaint accuses the defendant of infringing United States Letters Patent No. 2,531,999, issued on November 28, 1950, entitled "Manufacture of Crystalline Dextrose." The defendant is Corn Products Company, a New York corporation with a regular and established place of business in Summit, Illinois, within this District wherein it allegedly committed acts of infringement. The defendant answered the complaint and filed a counter-claim praying for a declaratory judgment that the patent in suit is invalid. This Court has valid jurisdiction over this controversy based on 28 U.S.C. §1338(a).

The plaintiff is the successor in business to the Wallerstein Company, formerly a corporation of New York, and by merger is the owner of the patent in suit. Rights to this patent were originally assigned by the inventor, Leo Wallerstein, to the Wallerstein Company. The plaintiff is engaged in the manufacture and sale of pharmaceutical supplies and continues the business of the Wallerstein Company in the manufacture and sale of enzyme preparations.

Crystalline dextrose, the subject of the patent in this controversy, is an essential ingredient in the blood of humans and animals, and its oxidation in the body serves

as the source of heat and energy necessary to human existence. It is manufactured from corn starch, or some other starch, by a cataylzed chemical change known as hydrolysis. This chemical change results from breaking up the molecule of starch into smaller pieces to which a molecule of water is attached, thereby producing a molecule of dextrose from each piece.

Neither the plaintiff, Baxter Laboratories, nor its predecessor, Wallerstein Company, is or was ever engaged in the manufacture or sale of crystalline dextrose as a commercial product. Wallerstein Company, during the period from approximately 1945 to 1955, investigated the possibility of developing the manufacture of crystalline dextrose to a commercial state and determined that the enzymatic conversion process would be quite expensive. This investigation culminated in commercial production. Wallerstein Company never made any crystalline dextrose for sale and is not now and never has been engaged in the commercial manufacture of crystaline dextrose under the patent in suit. The several owners of the patent in suit have never commercialized it. No license has ever been granted and no royalties have ever been paid to the owners of the patent. The patent is therefore a "paper patent" and is to be strictly construed. *Standard Oil Co.* v. *Globe Oil & Refining Co.*, 82 F.2d 488 (7th Cir. 1939).

The defendant, Corn Products Company, is a manufacturer of products derived from corn, including the manufacture of crystalline dextrose, which it has sold under the trade name of "Cerelose".

The hydrolysis of starch to dextrose using acid as a catalyst was conceived as early as 1811 by a Russian scientist, Kirchoff. He produced a dextrose syrup which could be used either as a liquid syrup, or when reduced to dry

form, as crystals or as a solid slab. However, the defendant pioneered the commercial production of crystalline dextrose. At first, it was produced on a small scale for medicinal purposes, since the problem of crystallizing dextrose on a commercial scale was extremely complex. But the defendant eventually managed to go into profitable commercial production of crystalline dextrose using acid as a catalyst.

Starch can also be converted to dextrose through a process of hydrolyzing the starch by using an enzyme preparation following preliminary liquefaction of the starch by either acid or enzyme hydrolysis. After subsequent filtration and concentration, syrups of various densities and crystallized glucose can be obtained.

The possibility of using an enzyme preparation to hydrolyze starch to dextrose was known and published as early as 1927, but until relatively recently no one has been able to effect the hydrolysis of starch on an economic commercial basis using an enzyme catalyst. In about 1960, the defendant began to change its starch-to-dextrose conversion step from an acid catalyst to an enzyme catalyst, and has operated its plants, both in the United States and in foreign countries, with an enzyme preparation as the hydrolyzing agent or catalyst since that time.

The first issue to be resolved is the accusation of the complaint that the defendant is infringing plaintiff's patent. For the purposes of this determination, I will assume the patent to be valid.

In order to determine whether there was any infringement of the plaintiff's patent rights by the defendant's production of crystalline dextrose, the Court must define the scope of the plaintiff's patent. These are the boundaries of invention protected by the patent. The Wal-

lerstein patent is entitled "Manufacture of Crystalline Dextrose" and relates to a method whereby ordinary plant starch, such as is commonly derived from corn or potatoes, may be commercially converted, or hydrolyzed to form relatively pure dextrose for use in a variety of industrial and pharmaceutical applications. The Wallerstein patent states (col. 1, lines 25-30):

> It is the object of this invention to effect the hydrolysis of starch under such conditions that crystallization is markedly facilitated, the production of undesirable by-products of litle value minimized, and increased yields of dextrose are obtained.

The Wallerstein patent allegedly discloses that the starch is to be pre-thinned by either acid or an enzyme, or it can be used directly in the enzyme conversion step. The starch or "conversion products thereof" (i.e. thinned or partially dextrinized starch) are then subjected to the action of a microbiological enzyme preparation having a "k" value of at least 1 to convert a substantial proportion of the starch to dextrose. The product of such conversion is then held at crystallizing temperature until discrete crystals are formed, and the crystals are separated from the mother liquor.

The "k" value is meant to represent the initial reaction velocity of the formation of dextrose by the enzyme. The Wallerstein patent sets forth conditions for its determination by a formula long used in enzymology. The "k" value is an indication of the potency per unit of the enzyme.

The Wallerstein application as filed, Serial No. 779,635, October 13, 1947, contained nine claims, all directed to the concept of hydrolysis of starch to dextrose by the action of an enzyme preparation and the subsequent crystalli-

zation and separation of the crystals from the mother liquor. These original claims were rejected both on prior art and because they were too broad and indefinite. Following an interview between applicant's attorney and representatives of the Wallerstein Company with the Examiner, amendments were made on or about April 27, 1950, such that all claims included a limitation that the "k" value of starch-glucogenase activity of the enzyme preparation employed was to be at least 1.0. This limitation of the starch-glucogenase activity to a "k" value of at least 1.0 thus became a characteristic feature of the invention.

One of the defendant's arguments in defending against the charge of infringement is that in their process they employ an enzyme preparation with a "k" value less than 1.0.

The defendant argues that the patent calls for use of an "enzyme preparation" with a "k" value greater than one. In their process, the defendant takes a substance with a "k" value far in excess of 1.0 and adds large quantities of water, thereby reducing the "k" value of enzyme and water mixture far below 1.0. The defendant argues that the "enzyme-and-water mixture which the defendant adds to the starch is the "enzyme preparation" to which the patent refers.

It is true that the terms "enzyme preparation" and "enzyme" are not distinguished or defined in the patent. These terms are seemingly used indiscriminately in the Wallerstein patent specification, while the term "enzyme preparation" alone is usesd in the claims. The "k" value determination, as given in Column 3 of the patent, is the determination of the starch-glucogenase activity of an enzyme preparation as stated in Lines 48-51 of the patent.

The specification of the patent does not specifically exclude measurement of the "k" value on the wet product which is added to the starch and which is arguably the "enzyme preparation" which the patent refers to.

However, the patent claims specify a step of "subjecting an aqueous disperson . . . to the *action of* a microbiological enzyme. . ." to produce dextrose. Defendant is not "subjecting" the aqueous dispersion, containing about two-thirds water, "to the action of" the water with which its enzyme preparation is mixed to produce dextrose. Such water is inert and has no action on the aqueous dispersion. Defendant is "subjecting" the aqueous dispersion "to the action" of the dissolved solids of the enzyme preparation to produce dextrose. The solids contain the starch-glucogenase activity which produce the dextrose. The "k" value of the substance to the action of which defendant is "subjecting" its aqueous dispersion to produce dextrose is in the general area of about 20.

The defendant contends that its "enzyme preparation" is the liquid which it adds to the substrate and that since this is sufficiently diluted to bring the "k" value to below 1, it does not infringe. Unfortunately, the patent claims do not purport to define the condition of the enzyme preparation as it is added to the substrate. But, the claims speak of "subjecting" the substrate "to the action" of the enzyme preparation. During the 72 hours or more employed by the defendant for conversion, it is only the action of the dissolved solids acting to produce dextrose to which the substrate is subjected. The evidence shows that, save for possible convenience in adding the enzyme preparation and originally mixing it with the substrate, there is no difference in result achieved by the dilution. The amount of dilution is selected, not for scientific reasons, but commercial necessity, which require that the

enzyme be easilly dispersed throughout the starch substrate.

The defendant also contends that a reason for diluting its enzyme preparation is to "standardize" its preparation in order to have uniformity of operation. However, the evidence showed that the "k" value of the diluted enzyme, or the glucamylase activity, the term which defendant uses in keeping its records, has varied widely and has not been "standardized". For example, in the month of May, 1964, the units of glucamylase activity at the Argo plant varied widely from day to day - from 10.8, 9.4 and 9.0 on the high side down to 1.7, 2.7 and 3.2 on the low side. There was no standardization of these values, and what they were was immaterial to the outcome of the defendant's process. Standardization, as I would expect the term to be used, was achieved by adding 750 "standard pounds" of enzyme to each batch. The defendant cannot be said to have been "stardizing" by putting the desired number of standard pounds of enzyme preparation in a tank and then filling the tank to its capacity with water, regardless of the amount of water required. This is the defendant's procedure and I cannot consider the adding of water "standardization".

Enzyme preparations, particularly those commercially available, are standardized at a specified potency. This enables the user to establish and follow consistent process dosages. Standardization, as the word is commonly employed is achieved by diluting the enzyme preparation to a preselected potency value. Defendant does not employ such standardization. It merely adds water - in known or unknown amount - sufficient to give a "k" value of the diluted mixture of less than 1.0. Defendant "standardizes", in the true sense, by using dosages of the same amount of "standard pounds" each day (one standard pound of dry

enzyme will contain 100,000 G.A. units - a "k" value of about 20).

The enzymatic *action* of the defendant's enzyme preparation would be identical whether the enzyme were added to the substrate as a powder or diluted with water. The substrate is subjected to the same enzyme activity whether the enzymes be added to the substrate dry, or with a little water, but less than enough to reduce the "k" value to 1, or with so much water that the "k" value becomes less than 1. The "k" value that is significant is the "k" value of the solids which, alone, contain the enzymatic activity. Use of the dry powder or the culture filtrate, each of which has a "k" value well in excess of 1, or defendant's use of the powder or culture filtrate diluted with water to give an "as is" "k" value of less than 1, causes the substrate to be subjected to the action of the identical enzyme and produces dextrose in the same manner, by the same means, and with the same results. I cannot therefore agree with the defendant that the "k" value is to be determined from the enzyme-and-water mixture which is added to the starch.

Defendant contends that the words in the claims of the Wallerstein patent "enzyme preparation" would mean to one skilled in the art the enzyme in the form in which it is added to the substrate, and that the claims refer to the "k" value at that time, regardless of the dilution, if any, with water. Two scientists called as witnesses by defendant testified to this meaning, but this testimony was not on the basis of the general meaning of the words in the art, but on the basis of the particular use of the words in the patent claims. Defendant's assistant director of research, familiar with patents as well as chemistry, and himself a patent applicant of at least one application in this field, remarked, after the possibility of dilution of

the enzyme to avoid infringement of the Wallerstein patent was suggested to him:

> I conceive of no scientific or legal basis for distinguishing between wet and dry enzyme preparation. We do not base our yield of dextrose on starch liquor but on starch. Whether the enzyme is prepared in water, extracted with water, or precipitated from water and is subsequently concentrated or diluted with water, can have little significance. It will be generally accepted that the enzyme activity is to be measured on a water-free basis.

One skilled in the art would know that the "k" value specified in the Wallerstein patent claims is the "k" value of the solids, and not the "k" value of solids diluted by addition of inert water. The enzymatic activity of the material is entirely in the solids, and "k", a measure of potency, should be determined on that basis.

The use of the words "enzyme preparation" in the patent claims is a proper, clear use of the words to mean "enzyme or enzymes" in the enzymatic substance. The use of the words "subjecting . . . to the action of a microbiological enzyme preparation" in the patent claims is a proper, clear statement that the substrate is subjected to the action of an enzyme or enzymes having the specified "k" values. While the Wallerstein patent does not expressly state that the "k" of the enzyme is to be measured exclusive of diluents, one skilled in the art would know that adding or taking away water would have no effect upon the activity of the enzyme and that its "k" value should be determined on a dry basis.

If it were true that the issue surrounding the definition of the "k" value was all that the Court need decide in order to determine infringement, judgment would be

entered for the plaintiff. However, defendant also argues that the process that they employ falls outside the claims of the plaintiff's patent since it includes as vital elements the use of inventions made by defendant on which the defendant has its own patents. I find that I am in agreement with this position.

The process patented by Wallerstein was described in the patent (col. 1, lines 30-40) as:

> . . . hydrolysis of starch and its partial conversion products is effected by suitable enzyme action under proper conditions, in which any preliminary breakdown of starch is limited in such a way as to minimize formation of reversion products capable of interfering with the crystallization, and the final hydrolysis with enzymes is conducted in such a way as to obtain a completeness of hydrolysis and a purity of hydrolsate, with respect to dextrose, not possible with known methods.

At this point, it would be helpful to note that a "transglucosidase" enzyme is one which forms products such as panoses and isomaltose from maltose. If one is seeking to form dextrose from starch, the presence of transglucosidase will cause some of the maltose to form products like isomaltose, which are undersirable since they cannot be readily converted into dextrose by a starch-glucogenase enzyme preparation, the presence of this type of enzyme thereby decreases the yield of crystallizable dextrose. While it had been known for a number of years that there were transglucosidase enzymes, not until about 1950 or 1951, after the issue of the Wallerstein patent, was it known that such enzymes might be found in enzyme preparations obtained from the fungal sources Aspergillus niger and Aspergillus oryzae. The specifications of the patent do not mention the words "purity" or "purifica-

tion" in connection with enzyme or enzyme preparation. The possibility of removing the transglucosidase activity from the enzyme preparation used in the suggested process was nowhere mentioned in the Wallerstein patent.

In addition, it is worth noting that results of experiments produced by the defendant at the trial demonstrated that increasing the "k" value by precipitation did not remove transglucosidase nor increase dextrose yields. They also established that removal of transglucosidase did not substantially change the "k" value. It was shown that removal of transglucosisdase from the enzyme preparation resulted in raising the dextrose content of the hydrolyzate beyond the value which could be attained by use of the enzyme preparation from which transglucosidase had not been removed.

It is very relevant at this point to examine in part the history of the development of the defendant's process. In about 1949, the defendant's research laboratory investigated the commercial feasibility of employing enzymatic conversion of starch with commercially available enzyme preparations as a substitute for acid conversion in their process of producing crystalline dextrose. This conversion produced 83% dextrose (dry basis), corresponding to a crystalline dextrose yield of 62%. This new process was not then competitive with acid conversion.

Further research and investigation brought about improvement in enzyme production around 1954 by improvement in nutrient solution which increased enzyme yield (GA units per milliliter) by a factor of about 9 and increased dextrose content to 90% and crystalline yield to 78%. By 1956, the improvement in enzyme production had more than doubled the 1954 figure of GA units per milliliter. The dextrose content dropped slightly to 86% and the crystalline dextrose yield was 69%.

The study of enzyme preparations for starch hydrolysis to dextrose conducted by the research department of Corn Products Company revealed the injurious effects of transglucosidase.

As a result of the defendant's study of transglucosidase in the enzyme preparation derived from Aspergillus niger, a method was discovered for removing the transglucosidase without substantial diminution of the saccharogenic fractions of the enzyme preparation. In 1956, the method of removing transglucosidase from the enzyme preparation was developed and patented (Kooi et al, 3,042,584). This did not increase the GA units per milliliter, but it did increase the dextrose content of the hydrolyzate to about 93%. This discovery was important as an inexpensive way of increasing the dextrose content of the hydrolyzate derived from the treatment of starch by an enzyme preparation in order to convert it to dextrose.

Patent No. 3,042,584, granted July 3, 1962, on Application Serial No. 77,531 filed December 22, 1960, continuation-in-part of Application Serial No. 666,469 filed June 18, 1957, in the names of Kooi, Harjes and Gilkison contains a full explanation of this inventive contribution and its mode of use and its advantages. Without the benefit of this discovery, the defendant's development of a commercial process would not have materialized.

By 1958, the defendant had developed the process of precipitating the enzyme to provide a dry powder concentrate suitable for storage and shipment. In 1960, the defendant discovered and developed mutants of Aspergillus niger (disclosed in Armbruster Patent 3,012,944) having superior yields of GA units per milliliter than previously known microorganisms. The research department of the defendant discovered, isolated, and cultured Asp-

ergillus niger mutant, Armbruster C-14 No. 13,497, from Aspergillus niger CPC M-370, which was isolated from soil sample obtained from Baton Rouge, Louisiana. Patent No. 3,012,944 was granted December 12, 1961, in the name of Frederick C. Armbruster on "Enzyme Preparation". This patent discloses the characteristic features, description and origin of the specific microorganism and its peculiar ability to yield glucamylase in larger amounts than any theretofore known microorganism.

This line of research and development work increased the glucogenase yield in terms of units per milliliter by about 70 times that which was initially available. At the same time, the fermenting capacity which was required for production of a given amount of enzyme dosage was reduced by a corresponding amount.

In 1960, the defendant substituted enzymes for acid as hydrolyzing agent. This would not have resulted in the economic commercial production of crystalline dextrose if the immediately preceding developments had not been made by the defendant.

I am satisfied from the evidence produced at the trial that the process employed by the defendant could not result in the economic commercial production of crystalline dextrose if a purified enzyme were not employed. In other words, if the defendant did not treat the enzyme they employ so as to remove the transglucosidase activity, the results they achieve would not be superior to the acid conversion process which they had employed in the past.

Since the Wallerstein patent claims a process for the production of crystalline dextrose in a better manner than the acid conversion then employed, and mentions nothing about the removal of transglucosidase from the enzyme employed, the defendant's process is not that of the Wallerstein patent.

Therefore, it is my conclusion that the defendant's process does not infringe the process claimed by the Wallerstein patent. It does not come within the claims of the Wellerstein patent and does not operate in the same manner. It obtains a different result through different means.

The defendant's process employs two important inventions which provide: (1) transglucosidase removal by an inexpensive absorption process (Kooi et al, 3,042,584), and (2) a microorganism that produces enzyme at a lower cost and with better glucamylase to transglucosidase ratio (Armbruster 3,012,944). Without at least the first of these inventions, defendant could not have gone into the production of crystalline dextrose by enzyme conversion.

In addition, the defendant's position is that there has been no infringement because the patent is invalid. This is pleaded both as a defense to the charge of infringement and as a counterclaim for a declaratory judgment.

The pertinent statutory section regarding patents, 35 U.S.C. §112, reads in part:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The defendant urges that the patent in suit fails to satisfy the requirements set out by this statutory section. It is argued that the evidence shows that the patent fails in numerous ways. Many of these are contradictory to each other and one wonders how the defendant hoped to

persuade the Court of the truth of these proposed self-contradictory findings. Possibly the most glaring example of this is the defendant's proposed findings which suggest on the one hand that the evidence shows that the invention is obvious from the prior art, and on the other hand that the patent is so vague as to render it meaningless to one skilled in the art. Certainly, maintaining both of these results at the same time offends logic. The defendant, nevertheless, suggests that I adopt findings of fact which would support both conclusions. I have found the defendant's proposed findings of fact and conclusions of law rather unhelpful. Nevertheless I am in agreement with defendant's conclusion that the patent in suit is invalid.

The patent specification says, Column 3, Lines 52-70:

> *In general,* to obtain starch hydrolyzates which readily form discrete crystals of dextrose it is desirable to use an enzyme preparation having a starch-glucogenase activity sufficient to effect *substantially complete* hydrolysis of the starch substrate in *not more than* 72 hours when *not more than* 1% of the enzyme preparation, based on the weight of the starch, is employed. Such an enzyme will have a "k" value *of the order of 1.0.* Enzyme preparations having a "k" value as high as 10 or even higher may be employed, the amount of the enzyme preparation used being decreased in proportion to the increasing "k" value. *In general,* the amount of the enzyme preparation used should be *at least about* 1/"k" parts by weight of starch or starch conversion products and *preferably about two to three times* this proportion of enzyme is used. (Emphasis added).

Upon first reading this portion of the patent it is apparent that the specification lacks the specificity which

would seem necessary in order to adequately desccribe an invention. Phrases such as "in general", "at least", "not more than", "on the order of", and "substantially complete" do not lend themselves to a precise scientific description of a process to be patented.

A more specific examination of the patent would serve to point up this criticism more clearly. The above quoted statement from the specifications says that there are three essential factors that control the hydrolysis operation; that they are interrelated to each other; and that the potency of the enzyme preparation to be employed shall be of a value of at least 1.0. The other factors must conform to the "k" which is adopted.

The three crucial factors set out by the specification are: (1) the potency of the enzyme in terms of its "k" value, (2) the amount of enzyme preparation as a per cent of the amount of starch, and (3) the time required to complete the hydrolysis.

Considering these three essential elements in the order provided above, I first find that the *manner* of determining the potency of the enzyme in terms of its "k" value is sufficiently described. In other words, the patent adequately describes how to determine the "k" value of an unknown enzyme preparation. This description, of course, is separate from a description of what amount that "k" value should be to make the process operate successfully. Various workers in the art already had proposed various methods of determining the potency of an enzyme preparation. Since the chemical composition, as well as the physical characteristics, of a pure enzyme were insufficiently known to constitute accurate definitions of specific enzymes, the art had adopted the practical yardstick of how much of a specific starch preparation will be convert-

ed in a given period of time per gram of the enzyme preparation.

The Wallerstein patent specification adopted a complicated method and formula for determining the potency of an enzyme preparation in regard to starch-glucogenase activity. This method assimilated the unimolecular reaction constant "k" from the unimolecular reaction law expressed in the equation:

$$k = 1/t \log 10 \; a/a\text{-}x$$

In the application of the unimolecular reaction constant "k" to potency or starch-glucogenase activity, the unimolecular reaction law, as expressed in the formula, is applied to the first thirty minutes of action upon the starch substrate of the enzyme preparation to be assayed or measured. For convenience of the determination, the various actions and conditions are arranged so that 50% hydrolysis is effected on the substrate in thirty minutes.

I find that this method of determining the potency of the enzyme preparation to be used in the process described by the patent is set out in such "full, clear, concise, and exact terms as to enable any person skilled in the art" to likewise measure and determine the potency of an enzyme to be employed in converting starch to crystalline dextrose.

But, knowledge of how to determine the potency of any given enzyme preparation is not equivalent to knowledge of the potency of the specific enzyme preparation to be employed in the patented process. In this regard, I find the patent specifications wanting.

The patent specifications state that the enzyme preparation to be employed "will have a 'k' value *of the order of* 1.0." I am convinced from the testimony at the trial

that this description of the "k" value of the enzyme preparation is not described so as to provide one skilled in the art "full, clear, concise, and exact" directions as to how to make an enzyme preparation with the potency needed for the successful practice of the process Wallerstein attempted to patent.

To describe the potency *"of the order of* 1.0" is not a sufficient disclosure to warrant a patent monopoly. It provides nothing more than a scant clue as to the potency to be used. No upper or lower limit is given on the "k" value in the process that Wallerstein claimed. The public is left without notice of the process which Wallerstein attempted to patent and has no way of determining whether a process they might choose to employ has avoided the Wallerstein patent or is infringing. Section 112 was designed to "guard against unreasonable advantages to the patentee and disadvantages to others arising from uncertainty as to their rights." *United Carbon Co.* v. *Binney & Smith Co.*, 317 U.S. 228 (1942). In *Universal Oil Co.* v. *Globe Co.*, 322 U.S. 471, the Supreme Court stated at Page 484:

> As a reward for inventions and to encourage their disclosure, the United States offers a seventeen-year monopoly to an inventor who refrains from keeping his invention a trade secret. But the quid pro quo is disclosure of a process or device in sufficient detail to enable one skilled in the art to practice the invention once the period of the monopoly has expired; and the same precision of disclosure is likewise essential to warn the industry concerned of the precise scope of the monopoly asserted.

In *Schriber-Schroth Co.* v. *Cleveland Trust Co.*, 305 U.S. 47 (1938), the Supreme Court stated at Page 57:

> The object of the statute is to require patentee to describe his invention so that others may construct and use it after expiration of the patent, and to inform the public during the life of the patent of the limits of the monopoly asserted, so that it may be known which features may be safely used or manufactured without a license and which may not.

See also: *Research and Development Corporation of Ill.* v. *Chase,* 88 F.2d 353 (7th Cir. 1937).

The second element is the amount of enzyme in relation to the amount of starch. I find that this element also is not set out in the patent in such a way as to satisfy the statute. The patent reads, Column 3, Lines 65-70:

> In general, the amount of the enzyme preparation used should be at least 1/"k" parts by weight for each 100 parts by weight of starch or starch conversion product and preferably about two to three times this proportion of enzyme is used.

I find that this description is not sufficiently meaningful to someone skilled in the art so as to satisfy the statutory requirements. The instructions in the patent do not adequately describe the amount of enzyme preparation necessary in order to achieve the predicted results. The description in the patent gives a lower limit to the amount of enzyme preparation, and gives a "preferred" range of "about two to three times this proportion". No upper limit is given.

This description is clearly inadequate. For example, I find that a reader skilled in the art who might attempt to construct his own commercial process for the production of crystalline dextrose and wishes to know whether his process would be infringing is given no indication of how

much enzyme preparation Wallerstein used in his experiments or of how much the Wallerstein patent covers.

The third factor which the patent sets out is the time required for completion of the desired amount of hydrolysis. This requirement could be fulfilled by the patent setting out either the amount of hours necessary, or the yield of crystalline dextrose available in terms of a percentage of the amount of starch which was started with. To determine when the patented process was completed, one could then either look at his timepiece or test the solution to see if the desired yield has been achieved.

In this regard, the patent also fails. Column 3, Line 55, of the patent refers to "a starch-glucogenase activity sufficient to effect substantially complete hydrolysis of the starch substrate". While the upper limit of substantially complete hydrolysis may be taken as 100%, it is impossible to determine from the patent what is claimed as the lower limit of substantially complete hydrolysis".

The plaintiff might argue that in the claims the phrase "to convert a substantial proportion of the substance to dextrose", Column 6, Lines 50-51, may, by reference to the specification, be considered to have an upper limit of "about 90%" in Example 1; "95%" in Example 3; "about 97" in Example 4; and "84%" in Example 5. But reference to the specification yields no hint as to what is the lower limit below which there would be no infringement of the claims. Furthermore, the minimum value of dextrose in Column 6, Line 11, would prevent attaining the objects of the invention, namely, facilitation of crystallization, minimization of undersirable by-products and increasing yields of crystalline dextrose.

The patent does, of course, say that the process is completed in "not more than 72 hours", but as was pointed

out by Dr. Kooi at the trial, this is not a specific or clear indication to one skilled in the art. The description in the patent clearly gives an upper limit, but offers no indication of any lower limit. Without knowledge of this lower limit, the patent does not provide information sufficient for one skilled in the art to either copy the process described in the patent or know when his own process was infringing on the process claimed by the patent.

The specification, therefore, fails to adequately describe the time required for crystallization of the dextrose liquor, and likewise fails to disclose crystallization dextrose yields obtainable from the same. This makes it impossible to determine whether or not the objects of the invention are accomplished. The absence of full instructions as to time of crystallization and yield of dextrose crystals obtained prevents the reader who is skilled in the art from either judging the truth of the statement of objectives or of knowing whether he has performed the process in such a manner as to obtain the stated benefits.

The specification of the Wallerstein patent is not written in "full, clear, concise and exact terms", but in unreasonably loose, indefinite, inexact and functional, terms, which require the reader to guess at the meaning of such terms, or, alternatively, to stop and determine the meaning and scope by experiment.

It has for years been the policy of this country that in patents, "If the specifications do not describe the invention with reasonable certainty and precision, the patentee can claim nothing under his patent." *Carlton* v. *Brokee*, 84 U.S. 463 (1873).

Indefinite terms are used in the Wallerstein patent with the result that it is impossible for a reader to determine

what is and what is not an infringement. The terms relating to numerical values are stated in an indefinite manner, and the reader of the patent, even though skilled in the art, cannot tell what are the upper limits and lower limits of items covered by numerical expressions. The description in the specification is, therefore, indefinite and does not provide the basis for a valid patent.

With no upper limit and no lower limit as a guide, the reader is in the predicament of encountering a monopoly in the making of crystalline dextrose and yet being unable to determine what falls within and what falls without the monopoly. The indefinite character of the expressions used, if permitted, would benefit the patentee at the expense of the public, since disregarding the requirements of the statute would give the patentee a scope greater than he could obtain by accurate definition of his claimed monopoly, as required by the statute.

The public has a right to know the lower limit as well as the upper limit, and the patentee has the duty to inform the public as a part of the *quid pro quo* for the patent monopoly and to inform the public of the limits of the patent monopoly. Without this level of disclosure, the specification cannot tbe said to be a "full, clear, and concise statement".

In addition to lack of specificity referred to already, the patent fails to identify the enzyme preparation employed in the Examples 1 to 5 of the patent specification. Nowhere throughout the specification or claims is there any identifiable enzyme preparation disclosed.

While there is a statement in the specification that the starch-glucogenase enzymes useful in the invention may be obtained from various fungal sources, particularly the species of Aspergillus, such as Aspergillus oryzae, and

from ceretain bacterial species, for example, Clostridium acetobutylicum, there is no positive statement which indicates the specific microorganism used by the inventor.

In the course of pretrial discovery, the plaintiff admitted that its enzymes were all derived from Aspergillus oryzae. But, this information as to the origin of the enzyme was not made available to the public by the patent specification, and virtually is an admission by the plaintiff that the terms of the claims referring to "a microbiological enzyme preparation" are based solely on enzymes derived from Aspergillus oryzae and, hence, the claims are not only indefinite, but also plainly broader than the invention.

Finally, as further proof that the patent was loosely and inaccurately drafted, the defendant showed at the trial that the claims cover inoperative conditions. During the trial, the defendant introduced extensive evidence of experiments which were done under the direction of Dr. Kooi conforming to the teachings of the Wallerstein patent. It was Dr. Kooi's opinion, as one skilled in the art, that the description of the process provided in the patent was so broad and loosely worded that it covered what were shown to be inoperable conditions. The experiments which Dr. Kooi testified to were done after 1960 and after the suit was brought. However, these experiments conformed to the requirements set out in the patent and nevertheless failed to produce the results predicted by the patent. There was no testimony to the effect that these same non-conforming results would not have been obtained by one skilled in the art in 1950, when the patent was issued.

The fact that the patent is so broad as to cover inoperative conditions is alone a conclusive argument that it does not satisfy the specificity required by the statute. It does not "distinctly claim the subject matter which the applicant regards as his invention", but rather requires the reader to experiment in order to get the claimed results. Such a patent is invalid. See: *Standard Brands* v. *Yeast Corp.*, 308 U.S. 34, 38 (1933).

I would like to wholeheartedly commend the plaintiff's counsel for the excellent work done both on their written documents and during the trial. However, for the foregoing reasons, I find that there has been no infringement of the Wallerstein patent and judgment on the complaint will be entered for the defendant. I further find that the patent is invalid for failure to satisfy the requirements of 35 U.S.C. §112, and judgment on the counterclaim will likewise be entered for the defendant and the patent is hereby declared to be invalid. These remarks will stand in the records as my findings of fact and conclusions of law.

Enter:

/s/ James B. Parsons
United States District Judge

Date: April 28, 1967.

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No. 551

In the
Supreme Court of the United States
OCTOBER TERM, 1968

CORN PRODUCTS COMPANY,
Petitioner,
vs.
BAXTER LABORATORIES, INC.,
Respondent.

BRIEF IN OPPOSITION TO PETITION FOR A WRIT OF CERTIORARI

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The Scheffer Press, Inc.—ANdover 3-6850

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BRIEF IN OPPOSITION TO PETITION FOR A WRIT OF CERTIORARI

FOREWORD

The Petition seeks a review by this Court of the Court of Appeals' decision that the Wallerstein patent had the "full disclosure" required by 35 U.S.C. 112.

There is no conflict with another Court of Appeals as to the matter.

The patent has now expired, so that the invention has entered the public domain.

The requirements of 35 U.S.C. 112, and similar prior requirements as to patent disclosures, have been ruled upon many times by this Court.

In short, there is no reason, and particularly no "special and important" reason, for review on writ of certiorari.

The principal reason urged in the Petition for the granting of the writ is an asserted conflict with the decision of this Court in *Beidler* v. *United States,* 253 U.S. 447 (1920). Additionally, the Court of Appeals is said to have disregarded Rule 52(a) of the Federal Rules of Civil Procedure.

Neither point is well taken.

While the statement in the Petition inadequately characterizes the invention here involved, the opinion of the Court of Appeals (394 F.2d 892, Petition p. 3a) properly describes it and gives sufficient background facts.

I.

THERE IS NO CONFLICT WITH THE DECISION OF THIS COURT IN BEIDLER v. UNITED STATES, 253 U.S. 447 (1920)

In *Beidler* v. *United States,* 253 U.S. 447 (1920), this Court held void a patent on a camera and developing apparatus. The apparatus and the manner of operation, as disclosed in the patent, would not provide a proper and useful development of the image. To modify the structure in order to render it operable was found to require "material changes" in construction from that disclosed in the description and drawings. It was in this connection that this Court stated, as quoted in the Petition (p. 4), that

> ". . . it has been consistently held that a correct and adequate description or disclosure of a claimed discovery . . . is essential to the validity of a patent, for the reason that such a disclosure is necessary in order to give the public the benefit of the invention after the patent shall expire."

The Wallerstein patent discloses an operable process and meets the requirements of 35 U.S.C. 112 (Petition, p. 1a). The Petition (p. 15) does state that "no one has been able to reproduce the examples of the process given in the patent (PA 164,568)". But what are the facts? At PA 164 one of the Petitioner's witnesses testified that he had performed each of the examples set forth in the Wallerstein patent, and that he consistently got lower yields. Were this the whole story, it would not establish inoperability because he did prove that he could practice the process—albeit not as well on the first try as the patentee had done.

But it is not the whole story.

Cross-examination brought out that the witness, on instructions of his superior, had used a particular enzyme in the experiment (PA 194). It was the remains of a small sample of enzyme, put out 8 years earlier "for experimental use only", and for conversion of cellulose—not starch. (PA 196-197). Other enzymes, recommended by the same commercial source for conversion of starch to dextrose, were readily available in the laboratory as well as commercially, but were not used (PA 200). When the superior who had decided to use the old "experimental" enzyme was later on the witness stand, he explained, "we knew ahead of time that it would not get good results" (PA 252). But even when trying to get poorer results, Petitioner established operability of Wallerstein's patent disclosure and demonstrated that it met the test of *Beidler* v. *United States, supra.*

In another test, Petitioner's technicians tried the patent examples with an enzyme appropriate for conversion of starch to dextrose. They then proved that when trying to get good results, they could follow the patent disclosure

and do so. Adhering to the procedures of Examples 1, 3, 4 and 5, Petitioner's technicians almost duplicated patentee's yields:

	Patent (PE pp. 2-3)	Petitioner's Duplication (PA 326-327)
Example 1		
DE	92	92.8
dextrose	90	88.5
Example 3		
DE	98	97.9
dextrose	95	96.9
Example 4		
DE	97	100
dextrose	97	99.1
Example 5		
DE	87	89.5
dextrose	84	85.3

In the foregoing test, Petitioner demonstrated that those skilled in the art can—and did—read the Wallerstein patent, understand it, and apply it.

The second reference to the record in support of the Petition's statement (p. 15) that no one has been able to reproduce the examples of the process given in the patent is to the testimony of one of Petitioner's witnesses that, in 1947, he could not have produced enzymes having the "k" value of the examples in the patent "without extensive experimentation" (PA 568). This is of no probative value, because no one would expect an M.D., working primarily in serology, having had no experience with enzymes for conversion of starch to dextrose, and not even knowing what enzymes were commercially available in 1947, to be able to produce such enzymes (PA 589-591, DA 37-40). But

even this witness admitted that at the time he testified (after the issuance of the Wallerstein patent and prior to its expiration) he could produce a suitable enzyme without experimentation (PA 584-5). Apparently his problem in 1947 was a then lack of knowledge of the available enzyme. He was not "too familiar" with the industry (PA 589), although he had done enough work by 1947 to know how to raise the "k" value of an enzyme (PA 595).

The Wallerstein patent is on a process of producing crystalline dextrose—not on an enzyme. Enzymes from many known sources, produced by various known techniques, will serve in the process. The significant point, as the patent clearly teaches, is that the enzyme have a "k" value of at least 1.0. And the District Court found that the "k" value determination is disclosed in such "full, clear, concise and exact terms as to enable any person skilled in the art" to determine it. (Petition p. 29a).

The patent disclosure, directed to those skilled in the art, states (P.E. 1, col. 2, lines 46-51):

> "The starch-glucogenase enzymes useful in the invention may be obtained from various fungal sources, particularly the species of Aspergillus, such as *Aspergillus oryzae* and from certain bacterial species, for example, *Clostridium aceto-butylicum.*"

In *Loom Co.* v. *Higgins,* 105 U.S. 580, 585 (1881), this Court said:

> "• • • When an astronomer reports that a comet is to be seen with the telescope in the constellation of Auriga, in so many degrees of declination, and so many hours and minutes of right ascension, it is all Greek to the unskilled in science; but other astronomers will instantly direct their telescopes to the very point in the heavens where the stranger has made his entrance into our system. They understand the language of their brother scientist • • •."

Thus it was that Petitioner's scientists, upon reading the Wallerstein patent, had no criticism of its disclosure with respect to enzymes. Within a few months of the issuance of the Wallerstein patent, one of Petitioner's scientists read it and commented in part (PE 5):

> "• • • The process is limited somewhat at present by the cost of available enzymes and the unavailability in industrial quantities of most suitable enzymes. However, very high yields, 90-95 per cent or higher, of dextrose which readily crystallizes is quite possible, particularly *with our know-how, on the choice and use of particular fungal glucosidases.*" (Emphasis added)

The author continued by pointing out that early work had been with enzymes prepared from *Aspergillus oryzae* (specifically mentioned by Wallerstein) but that work by "Northern Regional" (N.R.R.L., Northern Regional Research Laboratory of the U.S. Dept. of Agriculture) and by Petitioner, itself, showed that Rhizopus or *Aspergillus niger* yield glucosidase in a very high ratio (PE 5).

Petitioner's scientists were never at a loss as to the specific microorganism to employ, as the Petition might suggest. They understood, as Wallerstein taught, that there were many and varied available sources. As these scientists explained from time to time:

> "The ability to form an enzyme system which will convert a 17 DE starch hydrolyzate to about 90 per cent dextrose, d.b., is fairly common among members of the *Aspergillus niger* group" (PE 109).

> "Further, other members of the *Aspergillus* group can be used with equally good results" (PE 23).

Petitioner's scientists also understood Wallerstein as teaching purification of the enzyme.

> "In brief, the 'k' value is an expression of the purity of an enzyme preparation." (PE 26)
>
> • • •
>
> "Mr. Wallerstein thus maintains that in order to obtain the objectives of his 'discovery', it is necessary to use an enzyme preparation of sufficient purity that the enzyme preparation will have a 'k' value of at least 1.0." (PE 28)

And when these same scientists began to purify enzymes, they employed one of the well-known "classical methods" of purification (PE 86, 161)—the same method used by Wallerstein (PA 146).

As Petitioner's witnesses testified (PA 219, 235, 394, 594-5), and as documents coming from Petitioner's files (e.g. PE 5, 23-4, 86, 114-20) and the prior art (e.g. PE 154, 178, 183, 198) show, fungal sources, and enzyme production and purification techniques were well known. Petitioner in producing its enzymes for commercial use had to learn nothing from Wallerstein. It merely used standard, accepted technology:

> "All of the steps are standard steps accepted in the art as being normal steps in the attaining of an enzyme concentrate or an enzyme preparation." (PA 394)

The statutory requirement of a disclosure directed to those skilled in the art was met by Wallerstein. The truly novel features of his invention were fully described; the context in which his invention has commercial significance was understood. As the Court in *Loom Co.* v. *Higgins*, 105 U.S. 580, 586 held:

> ". . . That which is common and well known is as if it were written out in the patent . . . ."

The Court of Appeals properly applied this law. No conflict is shown with *Beidler* or numerous other decisions by this Court in which particular facets of the statutory disclosure requirement have long since entered the realm of settled law.* No change in the law is shown. No conflict among subsequent decisions of the Court of Appeals is asserted.

II.

RULE 52(a) OF THE FEDERAL RULES OF CIVIL PROCEDURE WAS NOT DISREGARDED BY THE COURT OF APPEALS

The divergence of views between the District Court and the Court of Appeals was not as to the basic facts. It was as to proper legal criteria. For example, the Petition (p. 8) states (the indicated emphasis is by Petitioner):

> "Judge Parsons after fifteen days of trial found that:
>
> > 'In 1960, the defendant substituted enzymes for acid as a hydrolizing agent. This would *not have resulted in the economic commercial production* of crystalline dextrose if the immediately preceding developments had not been made *by the defendant.*' (Appendix p. 25a)"

Observe that the District Court considered that the test was whether Wallerstein's disclosure, alone, would lead to "economic commercial production." Of course, there is no such requirement for disclosure. The disclosure

---

* See e.g. *Wood* v. *Underhill, et al.*, 46 U.S. 4 (1847); *Seabury* v. *Am Ende*, 152 U.S. 561 (1894); *Expanded Metal Co.* v. *Bradford*, 214 U.S. 366 (1909); *Hildreth* v. *Mastoras*, 257 U.S. 27 (1921); *Eibel Co.* v. *Paper Co.*, 261 U.S. 45 (1923).

must be of a useful process, and must be sufficient to enable those skilled in the art to practice it; but it need not meet any test of "economic" commercial operation—with all of its variables of cost of raw starch, price of crystalline dextrose, cost of power, cost of labor, interest rate on capital invested, etc.

As pointed out above, the decision of this Court in *Beidler* v. *United States*, 253 U.S. 447 (1920), upon which Petitioner relies, establishes no such rule. What *Beidler* stands for is that a disclosure is not adequate when, in order to make the device operable, one must omit structure and mode of operation which is disclosed, and replace it with structure and mode of operation which is not disclosed.

An applicable decision of this Court is *Hildreth* v. *Mastoras*, 257 U.S. 27 (1921) which points out (p. 34):

> "* * * It is not necessary, in order to sustain a generic patent, to show that the device is a commercial success. The machine patented may be imperfect in its operation; but if it embodies the generic principle, and works, that is, if it actually and mechanically performs, though only in a crude way, the important function by which it makes the substantial change claimed for it in the art, it is enough. *Telephone Cases*, 126 U.S. 1, 535; *Mergenthaler Linotype Co.* v. *Press Publishing Co.*, 57 Fed. 502, 505."

There is not enough data in the record with which to judge the commercial costs and economics implicit in the District Court's finding. But the Court of Appeals wasted no effort on this immaterial point. Instead, in evaluating the patent, it directed attention to that which this Court held critical in *Hildreth* v. *Mastoras, supra*, i.e., "the important function by which it makes the substantial change claimed for it in the art." (Petition p. 10a):

"The object of the patent in suit was to effect hydrolysis under such conditions that

a) 'crystallization is markedly facilitated;'

b) 'the production of undesirable by-products of little value minimized', and

c) 'increased yields of dextrose are obtained.'

"In 1954, defendant, after studying the Wallerstein patent, obtained these objects and did so before it invented an improved enzyme and before removing transglucosidase."

The evidence fully supports this statement.

As to crystallization, in 1954, Petitioner's scientists observed (PE 111):

"Just why crystallization of dextrose from an enzyme-converted liquor should be so much more rapid than crystallization from an acid converted liquor is difficult to understand. * * *"

As to undesirable by-products, in 1954 the same group observed (PE 112):

"* * * The important differences between enzyme process mother liquor and acid process hydrol are a lower HMF content, and a lack of bitter unpalatable materials in the enzyme process mother liquor. * * *"

Finally, as to increased yields of dextrose, in 1954 Petitioner was obtaining hydrolyzates with higher dextrose percentages than the 86-87% achieved in its acid hyrolyzates (PA 427). Petitioner, in doing so, recognized that no specific enzyme from some specified source was required. Its 1954 report showed (PE 109):

"The ability to form an enzyme system which will convert a 17 D.E. starch hydrolyzate to about 90 per cent dextrose, d.b., is fairly common among members of the *Aspergillus niger* groups."

The Petition states, with emphasis by Petitioner (pages 9-10):

> "The trial court found that the patent utterly failed to disclose the identity of such enzyme or its method of preparation:
>
> > 'I am convinced from the testimony at the trial that this description of the "k" value of the enzyme preparation is not described so as to provide one skilled in the art "full, clear, concise and exact" directions as to *how to make an enzyme preparation with the potency needed for the successful practice of the process Wallerstein attempted to patent.*' (Appendix p. 29a-30a)."

* * *

This does not convey the proper impression of what the District Court intended. The Court had heard one of Petitioner's scientists testify that as early as 1938 or 1940, those skilled in the art knew how to produce enzymes (PA 368), and had seen documents demonstrating the same fact (e.g. PE 154 *et seq.*, 180, 184). The evidence showed that in its commercial production of enzymes Petitioner had merely employed "standard steps", "accepted in the art as being normal steps" in such production (PA 394). Further the District Court found that the patent fully disclosed how to determine the "k" value (Petition, pp. 28a-29a).

Instead, the District Court's meaning must be found from the sentence opening the paragraph from which the Petitioner quotes, and which immediately precedes the Petitioner's quotation. This sentence reads (with emphasis supplied by the District Court, Petition p. 29a):

> "The patent specifications state that the enzyme preparation to be employed 'will have a "k" value *of the order of* 1.0' * * *"

The District Court's opinion was that disclosure of a "k" value "of the order of 1.0" was not enough. Such finding need not be examined, because it is immaterial. The phrase "of the order of" appears only in a general discussion of the enzyme. Additionally the patent states that "k" values of 10 or more may be used and the claims specify "at least 1.0." This is clear to one skilled in the art who knows how to produce enzymes, and how to raise their "k" value "without very much trouble" (PA 595).

The District Court's finding that a specific enzyme from a specific source is not disclosed (Petition, p. 10) flows from an examination of the patent itself. The Court of Appeals did not reverse the finding. It merely held that the significant identification, "k" value, was fully disclosed and that since the specific source was immaterial as a scientific fact, it was immaterial in a patent disclosure. A specific source, *Aspergillus oryzae,* and, broadly, other species of *Aspergillus* were disclosed (PE 1, col. 2, lines 46-51).

Under the heading, "The Trial Court Found Wallerstein's Patent Was Not The Basis For Petitioner's Process", the Petition (pp. 12-14) quotes extensive fragments from the District Court's opinion. The most significant of these findings is that in about 1949 Petitioner investigated the commercial feasibility of enzymatic conversion of starch in producing *crystalline* dextrose. This was in error. Petitioner, like others in the art prior to Wallerstein's disclosure, was working on syrups (PA 312). Petitioner first produced *crystalline* dextrose from an enzyme hydrolyzate in 1954 (PE 95), as is more fully discussed above.

In this same regard, the Petition may be misleading. The Petition (p. 22) quotes a fragment from the Court of Appeals decision as follows:

> "'The patent in suit discloses and claims the basic steps necessary to the successful enzyme hydrolysis of starch . . .' (Appendix, p. 6a)."

This is not what the Court of Appeals said, or had in mind. The "successful enzyme hydrolysis of starch" had been accomplished prior to Wallerstein, as the Petition points out (pp. 7-8) and as the evidence shows (e.g. PE 154, 178, 183). The art knew of appropriate enzymes and how to produce them. But the art did not have the key to so conducting the hydrolysis as to produce *crystalline* dextrose. The Court of Appeals recognized this. Its full sentence (Petition p. 6a) was:

> "The patent in suit discloses and claims as invention the basic steps necessary to the successful enzyme hydrolysis of starch *to produce a dextrose hydrolyzate of such character that discrete crystals of dextrose may be readily obtained.*" (Emphasis added).

The patent fully discloses that this may be accomplished by limiting any preliminary acid treatment, and using an enzyme from any of the known sources, such as *Aspergillus oryzae*, which has a "k" value of at least 1.0 (PE 1, col. 1, lines 40-51, col. 2, lines 23-33, PE 2, col. 1, lines 14-70, and Examples 1-5). Petitioner's scientists so read the patent and, on the first effort at crystallization achieved the result so readily that they commented (PE 111):

> "Just why crystallization of dextrose from an enzyme-converted liquor should be so much more rapid than crystallization from an acid converted liquor is difficult to understand."

Though they wondered as to the "why" of the phenomenon, they were nonetheless readily able to achieve it.

CONCLUSION

For the reasons set forth, the Petition for a Writ of Certiorari should be denied.

Respectfully submitted,

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JOHN F. DAVIS, CLERK

No. 551

In the
Supreme Court of the United States

OCTOBER TERM, 1968

CORN PRODUCTS COMPANY,
Petitioner,

vs.

BAXTER LABORATORIES, INC.,
Respondent.

REPLY BRIEF IN SUPPORT OF PETITION FOR A WRIT OF CERTIORARI

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The Scheffer Press, Inc.—ANdover 3-6850

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INTRODUCTION

This Court should make it clear that the rule in *Beidler* v. *United States,* 253 U.S. 447 (1920), applies equally to chemical cases and should put a stop to the eroding disregard of Rule 52(a) by Courts of Appeal. Respondent's Brief emphasizes the need which exists for guidance to the Courts of Appeal on both issues.

The issues here are of law. It is, therefore, meaningless and obfuscatory at this stage to examine the evidence at trial to which Respondent chose to devote the majority of its brief. There is, indeed, no purpose whatever to be served in attempting, as does Respondent, to support the "findings" of the Court of Appeals. The trial court held

the patent invalid, applying the principle of *Beidler* v. *United States*, 253 U.S. 447 (1920). And the Court of Appeals reversed without even considering the critical findings or their legal effect. Absent the Court of Appeals holding those crucial findings clearly erroneous, it had no choice but to affirm the trial court under the law of *Beidler*.

Respondent tries to avoid the thrust of Beidler by rehashing the evidence. But, it avails it nothing under either Rule 52(a) or *Beidler*.

Lest it be forgotten—after Respondent's effort to draw the Court's attention away from the questions before it—we are dealing here with a process for making an old material by an old chemical reaction which is characterized by a single, purportedly novel feature: the use of a special enzyme. (Petitioner's Statement pages 7-8) And the trial court found explicitly that the patent failed to teach those skilled in the art how to produce that enzyme (Appendix p. 29a-30a)

I.

THE FACTS SHOW ACHIEVEMENT OF A PROPER AND USEFUL PROCESS ONLY AFTER YEARS OF RESEARCH FOLLOWING ISSUANCE OF THE WALLERSTEIN PATENT.

Respondent can point to no one who could achieve the objective of the patent, namely, an enzyme process as good as the acid process prior to petitioner's adoption of an enzymatic process which came after years of experimentation following issuance of the patent. What it calls "Petitioner's Duplication" on page 4 of Respondent's Brief, are 1964 results using knowledge as of 1964 (PA 327). That knowledge was gained in the 14 years following issuance of the Wallerstein patent, including two of petitioner's subsequent inventions. (PA 327, 329).

Respondent points to no testimonial record to support the argument that its special enzyme preparation or one comparable to it was known to those skilled in the art when Wallerstein filed his application in 1947. Indeed, there is no such testimony. Its attack on the qualifications of one of the witnesses on the issue (Its Brief pp. 4-5) and its reliance on his agreement that he could have found a suitable enzyme in 1966 (PA 584-5) do not raise a conflict with the findings of the trial court. It makes no reference to any document giving instructions or identification of such an enzyme as of 1947 or even 1950 when the patent issued.

Respondent suggests (Its Brief p. 6) that one of petitioner's engineers knew how to produce crystalline dextrose by an enzymatic process as early as 1951. This is not a fact. Its reference is to a letter (PE 5) in 1951 expressing a hoped for process, which process became a reality only after two inventions by petitioner's own researchers some years later.

The "specific organism" to which Respondent alludes (Its Brief p. 6) is anything but. Respondent concedes that the patent does not disclose a specific enzyme (Its Brief p. 12). The term *Aspergillus* denotes, as noted at PE 109, a "group" which comprises hundreds of different strains of micro-organisms. (PA 559-60) In 1960, petitioner's researchers, by irradiation and transmutation of one such micro-organism found in the soil of Louisiana, found a strain that was useful to produce an advance in the technology of starch to dextrose conversion. (PExh. 186-191)

Purification of an enzyme, on which Respondent places emphasis, when done by the "classical methods" referred to at pages 7 and 11 of its Brief, was not the answer. The testimony cited (PA 394) describes standard steps *plus* the inventions of Petitioner's patents Nos. 3,012,944 and

3,042,584. "Classical methods" without the subsequent inventions were insufficient.

The patentee Wallerstein, as the trial court found, gave neither the "degrees of declination" nor the "hours and minutes of right ascension" required by the astronomer in *Loom Co.* v. *Higgins,* 105 U.S. 580, 585 (1881), quoted at page 5 of Respondent's Brief. But the Court of Appeals disregarded that finding as well as the law of *Beidler* v. *United States,* 253 U.S. 447 (1920) which requires a disclosure sufficient to achieve a proper and useful advance in the art.

II.

THE RULE OF BEIDLER v. UNITED STATES APPLIES TO CHEMICAL CASES AND TO THE ADVANCE CLAIMED TO HAVE BEEN MADE.

Respondent begins Part II of its brief (p. 8) with the remarkable statement:

> "The divergence of views between the District Court and the Court of Appeals was not as to basic facts."

We agree completely. Certainly, if there was a divergence of views on the factual finding of inadequacy of disclosure, it is not reflected in the Court of Appeals' decision. And that is precisely the point! The Court of Appeals was powerless under *Beidler* v. *United States,* supra, and under 35 US.C. 112 to hold the patent valid without a "divergence of views" between it and the trial court on the facts of that crucial issue.

Respondent concedes that the District Court correctly found that the information, including the Wallerstein patent would not in 1960 "have resulted in the economic commercial production of crystalline dextrose" if the Petitioner's researchers had not made two independent inventions. (Its Brief p. 8)

Respondent argues that any minimal ability to convert starch to crystalline dextrose was enough. That's not enough in this case because that was old with both enzymes and acid catalysis and the product was old. The only basis for patentability was an improvement in the process. The argument would have some application if the patentee were the first to use an enzyme, but as the Court of Appeals correctly noted:

> "The possibility of using an enzyme preparation to hydrolyze starch to dextrose was known as early as 1927. The *difficulty* encountered was to effect such a hydrolysis of starch on an *economical commercial* basis." (Appendix 4a)*

Respondent does not contest this statement, but argues that both it and the trial court's findings of fact are immaterial. The issue is thus drawn: Under 35 U.S.C. 112, must a patent contain a disclosure adequate to achieve that result which is both stated in the patent as its object and found to be the advance over the state of the art.

The question presented is not answered by *Hildreth* v. *Mastoras,* 257 U.S. 27 (1921), cited by Respondent at page 9. In that case and the other cases referred to in the quotation, the patent disclosure was acknowledged to describe a workable, mechanical means of producing the *new and different* mechanism and of achieving the *new* result. In each case, adequate directions were given for at least one way of accomplishing the *new* operation or result. Whether that one described way could thereafter be improved is premised on the existence of the original workable description. The ability to achieve an improvement on the new action or result is a different question, indeed. Here the patent was purportedly granted for an improvement over

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* Emphasis added unless otherwise stated.

the acid process. Only after its own two inventions was petitioner able in 1960 to substitute enzyme for acid.

Respondent's sole argument in answer to the issue which is posed is its contention that a disclosure of a "k" value greater than one is enough. The basic findings of the Trial Court, which Respondent claims are not in dispute, are to the contrary. A mere definition of a "k" value for an enzyme preparation without disclosing a single source or way to obtain that enzyme is not enough. (Findings quoted in Petitioner's Statement at pages 9-10).

Irrespective of the list of subsidiary objects recited at the top of page 10 of Respondent's Brief, the advance or "substantial change" in the art was the discovery by Petitioner, not the patentee, of a suitable enzyme. As the Court of Appeals recognized:

> "Apparently the only reason defendant did not earlier change from acid hydrolysis was the cost involved and the *difficulty in obtaining the enzyme needed.*" (Appendix 9a)

The failure of the Court of Appeals to give legal effect to the lack of a suitable enzyme is a clear disregard of the Rule of *Biedler* v. *U.S.*, 253 U.S. 447 (1920) and of the findings of the trial court.

Further, the findings of the Trial Court and the record establish that a "k" greater than one was not the answer. To accomplish the stated objects of the invention to the extent that they were new, two inventions by Petitioner's researchers were required. Respondent concedes this in the openings pages of its Brief, in pointing out at pages 3 and 4 that as late as 1963 or 1964 the only known way to achieve results comparable to those set out in the Wallerstein patent was by the use of an enzyme derived and treated by the methods of Petitioner's subsequent patents.

Respondent does not support its attempted justification of the holding of the Court of Appeals by its reference to Petitioner's work in 1954, four years after the Wallerstein patent issued. (Its Brief p. 10). The Petitioner had been working on enzymes for four or five years prior to the time the quoted laboratory report was rendered. (PA 312).

The Trial Court meant exactly what it said in the portion of its opinion and finding quoted by Respondent, that:

> "I am convinced from the testimony at the trial that this description of the 'k' value of the enzyme preparation is not described so as to provide one skilled in the art 'full, clear, concise and exact' directions as to *how to make an enzyme preparation with the potency needed for the successful practice of the process Wallerstein attempted to patent.*" (Appendix p. 29a-30a).

CONCLUSION

Under *Beidler* v. *United States,* Respondent's failure to disclose how to produce the special enzyme renders the patent invalid. Since the trial court explicitly found the patent to have failed in that vital respect, the holding of patent validity by the Court of Appeals without consideration of such findings necessarily had to be in direct conflict with the *Beidler* rule or in total disregard of Rule 52(a). On either score, grant of certiorari is essential to rectify the error.

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